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TRADE NAME	MODEL	SET AND FOLDER No.
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Fada	17KD, 17L1, 17L2, EB, LO, 21KA, 21K1, LO, 21L1, 21L2, EB, LO, 21L3, BM, 21T10, V221TBM Tel. Rec.	281-3
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Mopar	833, 834, 836	281-5
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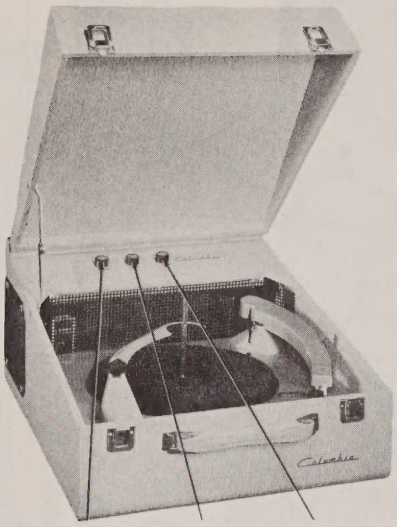
COLUMBIA RECORDS
MODEL 318



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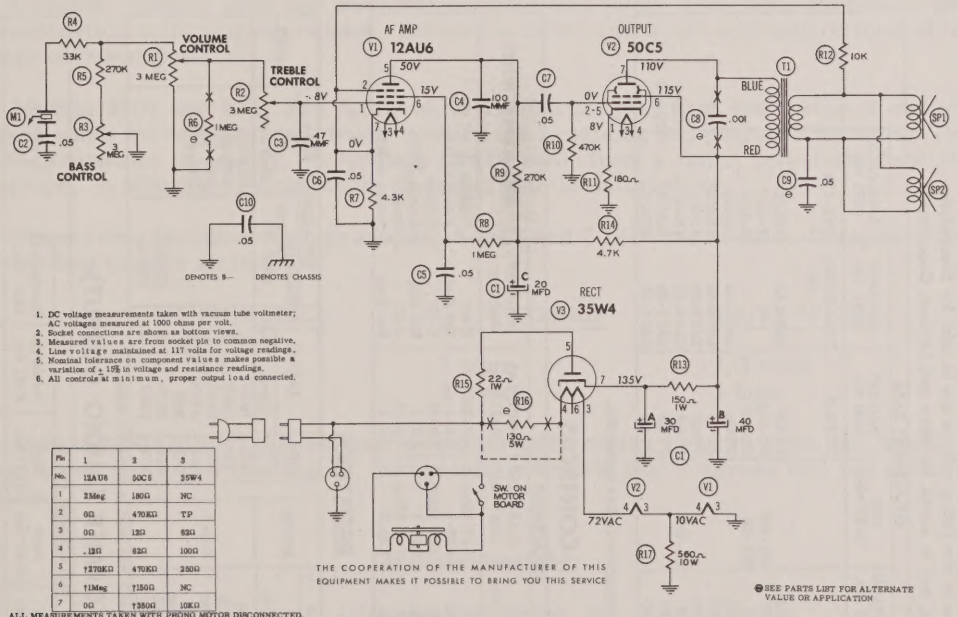
TRADE NAME	Columbia Records Model 318
MANUFACTURER	Columbia Records, 799 Seventh Ave., New York 19, N. Y.
TYPE SET	AC Operated Phono Amplifier With 3 Speed Automatic Record Changer
TUBES (Three)	Types 12AV6 AF Amp., 50C5 Output, 35W4 Rectifier
POWER SUPPLY	105-125 Volts AC - 60 Cycles RATING .23 Amp. @ 117 Volts AC

FOR SERVICE INFORMATION ON COLUMBIA RECORD CHANGER MODEL 950-274 - SET PHOTOFACT SET #276 — FOLDER #4 .

COLUMBIA RECORDS
MODEL 318



1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

Pin No.	1	2	3
1	2Meg	180Ω	NC
2	0Ω	470KΩ	TP
3	0Ω	12Ω	62Ω
4	.12Ω	62Ω	100Ω
5	†270KΩ	470KΩ	250Ω
6	†1Meg	†150Ω	NC
7	0Ω	†350Ω	10KΩ

ALL MEASUREMENTS TAKEN WITH PHONO MOTOR DISCONNECTED.
† MEASURED FROM PIN 7 OF V1.
NC - NO CONNECTION
TP - TIE POINT

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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THE COOPERATION OF THE MANUFACTURER OF THIS EQUIPMENT MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

⊖ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

281-1

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed." "Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. Copyright 1955 by Howard W. Sams & Co., Inc., Indianapolis 5, Indiana, U. S. of America. Copyright under International Copyright Union. All rights reserved under Inter-American Copyright Union (1910) by Howard W. Sams & Co., Inc." Printed in U. S. of America

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		Columbia Records PART No.	STANDARD REPLACEMENT		
V1	AF Amp.	12AU6	12AU6	7BK	
V2	Audio Output	50C5	50C5	7CV	
V3	Rectifier	35W4	35W4	5BQ	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT	Columbia Records PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1A	30	150				TCT3116	TDL-403020-150	CST-524	
B	40	150							
C	20	150							
C2	.05	400		DF-503		PT415	IMP4-S5	330415	
C3	47			D6-470	831-470	UC-5447		K-1447	
C4	100			D6-101	801-101	UC-531		K-1310	
C5	.05	200		DF-503		PT415	IMP2-S5	330215	
C6	.05	200		DF-503		PT415	IMP2-S5	330215	
C7	.05	200		DF-503		PT415	IMP2-S5	330215	
C8	.001	400		D6-102	811-102	PT601	IMP6-D1	330421	Note 1
C9	.05	400		DF-503		PT415	IMP4-S5	330415	Note 2
C10	.05	400		DF-503		PT415	IMP4-S5	330415	

Note 1: Not used in all versions.
Note 2: Some versions may use a .01MFD capacitor in this application.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	Columbia Records PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R1A	3Meg	½	BA011-1347	Q13-140	A47-3Meg-Z	AB-85	U-57	Volume
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R1A
R2A	3Meg	½	BA011-1347	Q13-140	A47-3Meg-Z	AB-85	U-57	Treble
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R2A
R3A	3Meg	½	BA011-1347	Q13-140	A47-3Meg-Z	AB-85	U-57	Bass
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R3A

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	Columbia Records PART No.	IRC PART No.	
R4	33KΩ	½		BTS-33K	
R5	270KΩ	½		BTS-270K	
R6	1Meg	½		BTS-1Meg	Note 1
R7	4300Ω	½			
R8	1Meg	½		BTS-1Meg	
R9	270KΩ	½		BTS-270K	
R10	470KΩ	½		BTS-470K	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	Columbia Records PART No.	IRC PART No.	
R11	180Ω	½		BTS-180	
R12	10KΩ	½		BTS-10K	
R13	150Ω	1		BTA-150	
R14	4700Ω	½		BTS-4700	
R15	22Ω	1			
R16	130Ω	5	CS540		Note 1
R17	560Ω	10	CS541		

Note 1: Not used in some versions.

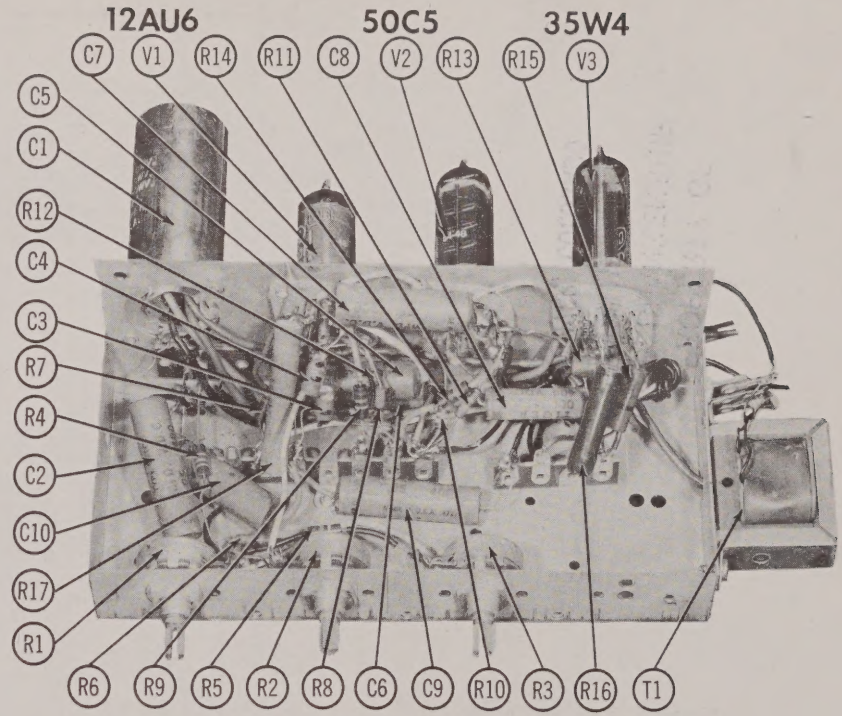
TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	Columbia Records PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	
T1	2.4KΩ	1.65Ω	CS532	A-3876	A-2928	S-2X	Z1001	24S50	

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA			NOTES
	SIZE	FIELD	V. C. IMP.	Columbia Records PART No.	JENSEN PART No.	QUAM PART No.	
SP1	6"	PM	3.3Ω	CS533		6A21LF	
SP2	6"	PM	3.3Ω	CS533		6A21LF	

CHASSIS—BOTTOM VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA					REMARKS
	Columbia Records PART No.	ASTATIC PART No.		ELECTRO-VOICE PART No.		
		CARTRIDGE	NEEDLE	CARTRIDGE	NEEDLE	
M1	CS529	92-TB	K-1 & K-3	46T	0-1 or S-1 & 0-3	

ASTATIC AND ELECTRO-VOICE NEEDLE LISTINGS SHOWN ABOVE ARE SPECIFIED FOR THE RESPECTIVE REPLACEMENT CARTRIDGES LISTED. FOR ORIGINAL CARTRIDGE NEEDLE REPLACEMENT SEE BELOW.

PHONO NEEDLE

(FOR REPLACEMENT IN ORIGINAL EQUIPMENT CARTRIDGE)

ITEM No.	REPLACEMENT DATA				REMARKS
	Columbia Records PART No.	JENSEN PART No.	PERMO PART No.	WALCO PART No.	
M2		†CR-55 or ♦CR-55D and †CR-55LP or ♦CR-55LPD	†A-448 or ♦A-448D and †C-449 or ♦C-449D	†W-64S and †W-64MGS	† Jewel ♦ Diamond

MISCELLANEOUS

ITEM No.	PART NAME	Columbia Records PART No.	NOTES
	Cabinet	CS544	
	Knob	CS535	Control - 3 used

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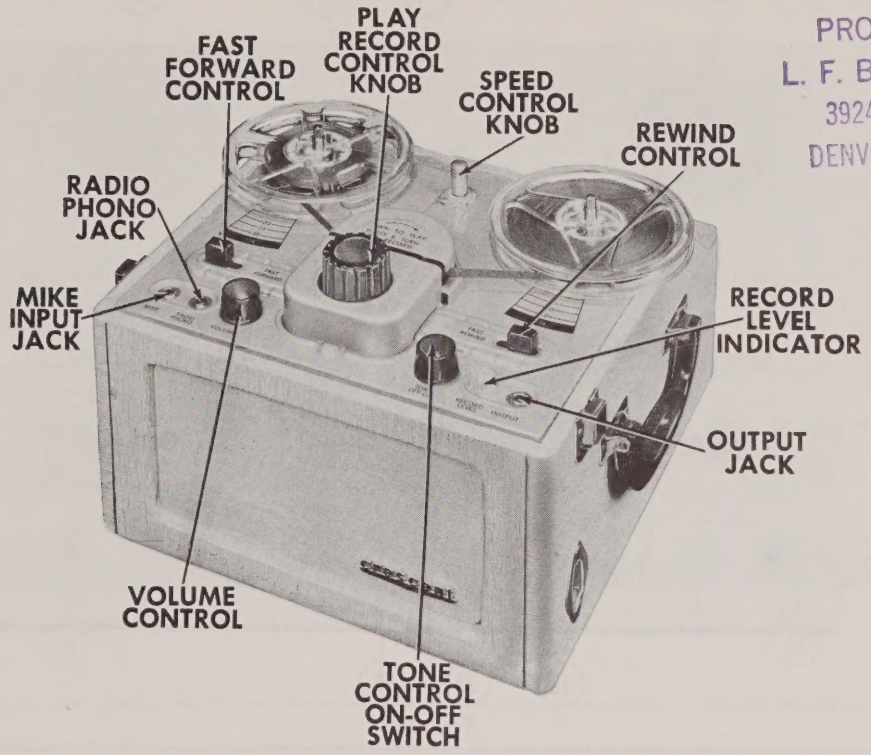

Figure 1 Model 9037

GENERAL INFORMATION

Crescent Models 2900 and 9037 are mechanically alike. The major difference between the two models is in the amplifiers used. Notice the difference in the schematics located toward the rear of this manual.

Models 2900 and 9037 are designed to record and play back two tracks of material on standard width recording tape, which doubles the recording and playing time with no loss of frequency response or quality. Recordings can be made from a radio, television receiver, or phonograph, in addition to those made directly from the microphone.

These recorders have two tape speeds, 3 3/4" and 7 1/2" per second. Using both tracks, the recording time is as follows:

SIZE REEL	3 3/4" SPEED	7 1/2" SPEED
5"	1 hour	1/2 hour
7"	2 hours	1 hour

Models 2900 and 9037 are designed to operate on 60 cycle, 110-120 volts, AC supply only. Before connecting to your line supply, be absolutely certain that it agrees with the above specifications.

Manufactured by:

Crescent Industries, Inc.
5900 West Touhey Avenue
Chicago 31, Illinois

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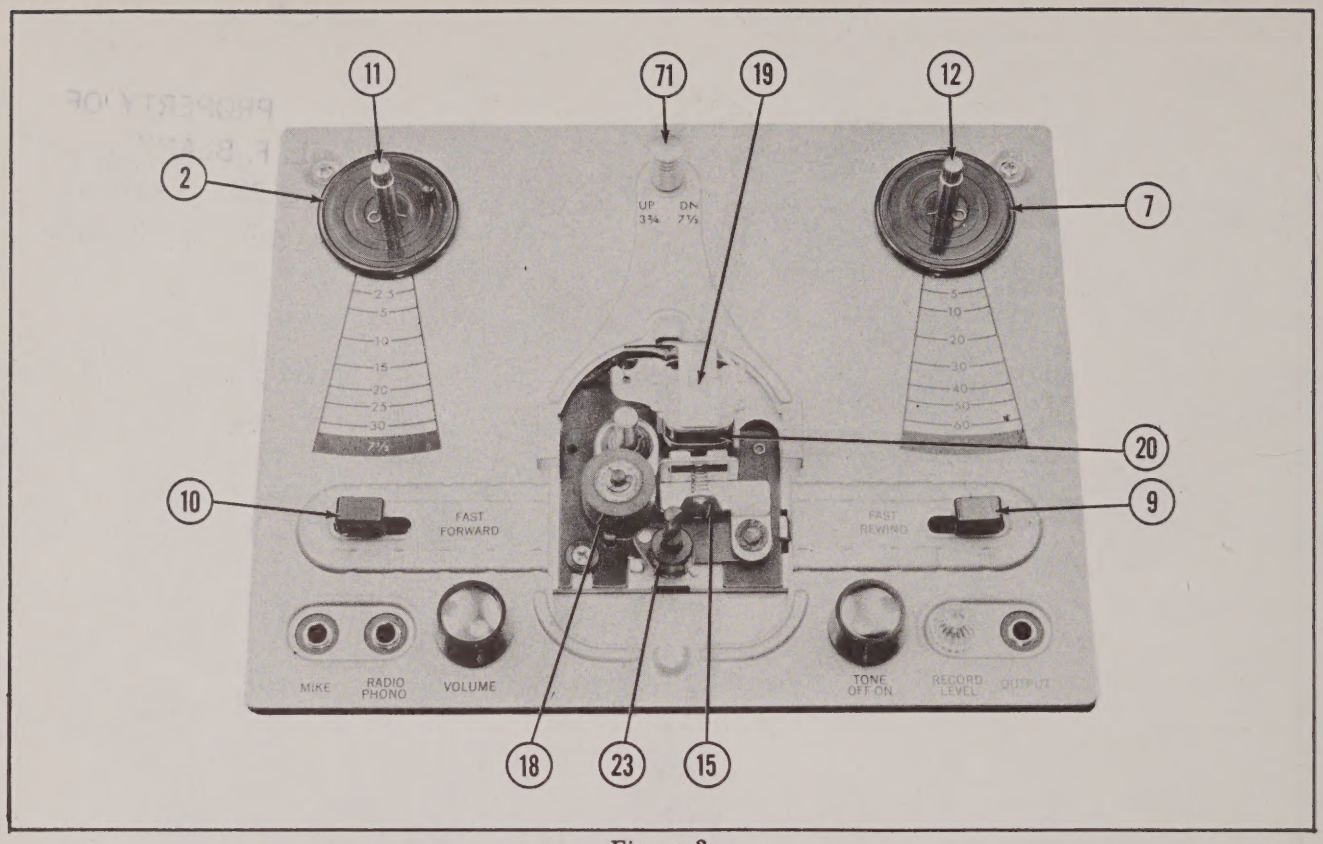

Figure 2

SPECIFICATIONS

Fast Forward & Fast Rewind Speed-

Models 2900 & 9037... 5" reel, 45 seconds.
7" reel, 90 seconds.

Frequency Response-

Models 2900 & 9037...3 3/4" speed - 65 to 6000 c. p. s.
7 1/2" speed - 65 to 8500 c. p. s.

Power Output-

Model 2900... 2. 5 watts undistorted
5 watts maximum
Model 9037... 2 watts undistorted
3 watts maximum

Inputs-

Models 2900 & 9037... Mic., 1Meg. Imp. Radio-Phono, .5Meg. Imp.

Outputs-

Model 2900... Two Internal 6" Speaker.
Model 9037... One Internal 5" Speaker.
Models 2900 & 9037... External - High impedance output for Ext. Amp. or Monitor in Record or Playback position.

External - Low impedance across 3.2 ohm voice coil for Ext. Speaker.

Bias & Erase Frequency-

Models 2900 & 9037... 50K. C.

OPERATING INSTRUCTIONS

Speed Control-

Changing speeds is accomplished by placing the speed button in the "Up" or "Down" position. "Up" for 3 3/4" per second and "Down" for 7 1/2" per second.

CAUTION: Do not operate this control unless the On-Off control is in the "On" position.

Threading The Tape-

1. Place a reel of tape on the right reel plate (7) and an empty reel on the left reel plate (2) making sure the reel slots engage the pins on the reel plates.

2. Unwind about 10" of tape from the reel. Hold a section of the tape straight with both hands and insert the tape in the tape slot making sure the dull coated side faces the rear of the recorder.

3. Insert the free end of the tape into one of the three radial slots in the hub of the empty reel. Turn the reel several turns, clockwise, until the tape is secured to the reel and all slack is taken up between reels.

To Record From Microphone-

1. Turn the On-Off Tone Control clockwise until a click is heard and allow about thirty seconds for the tubes to warm up.

2. Insert the microphone plug into the "Mike" jack.

3. Depress the play-record control knob (4) as far as it will go, turn clockwise until it locks while holding it down.

4. Hold the microphone about six inches from your mouth and speak in a normal voice. Adjust the

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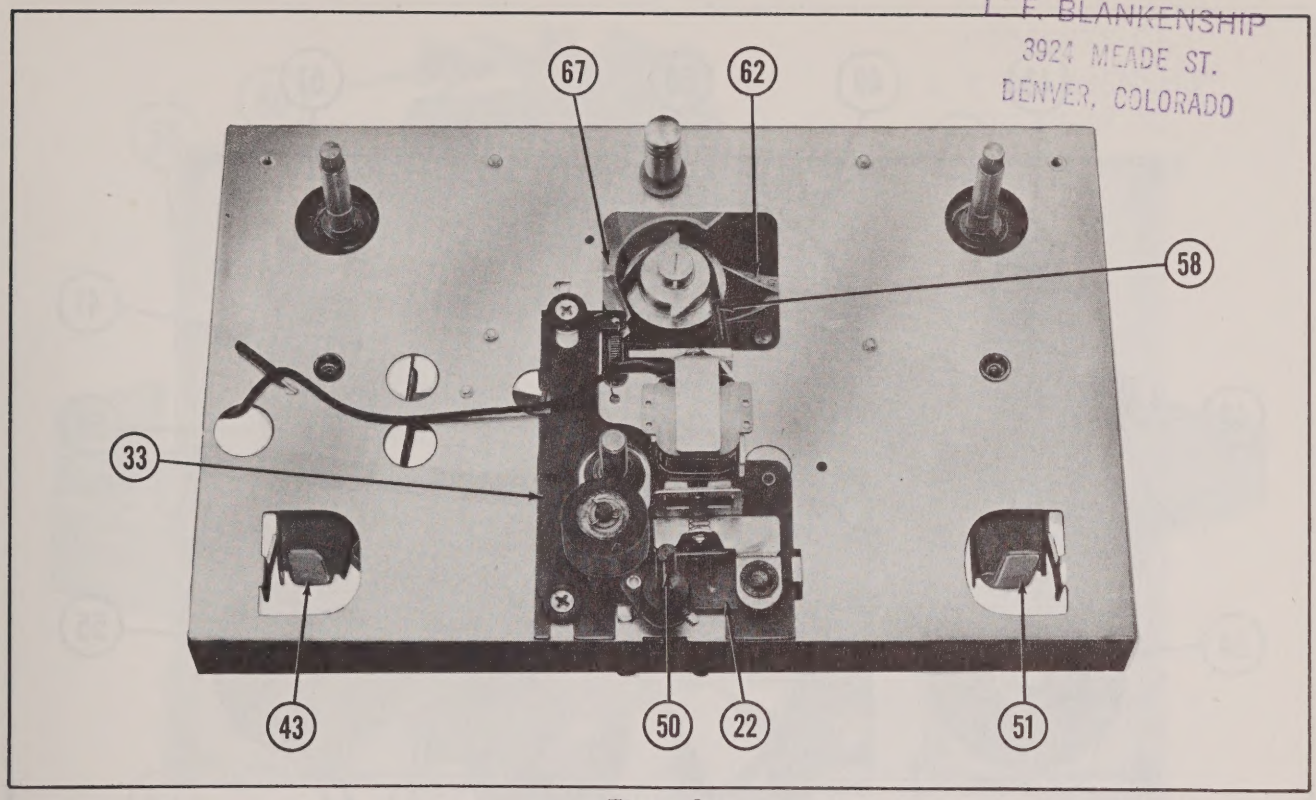

Figure 3

"Volume" control until the record level indicator flashes on the loudest sounds.

NOTE: Correct recording volume is very important. Too weak a signal, which does not cause the record level indicator to flash, will result in weak playback and high background noise. Too strong a signal, causing the level indicator to flash continuously, will result in distortion during playback.

To Record From Radio-

Recordings from a radio may be made by one of three ways:

1. Place the microphone about 6" to 12" in front of the radio speaker. Turn the radio volume control to a normal level. Setting it too high will cause distortion. Turn the radio tone control to maximum treble. Set the recording level and proceed with recording as described under "To Record From Microphone". This type of recording may not be satisfactory as other sounds may be picked up by the microphone which as a result will be recorded on the tape.

2. Have a shielded cable made up with a two conductor phone plug on one end and two alligator clips on the other end. Connect the alligator clips across the voice coil terminals on the radio speaker and insert the cord plug into the "Radio-Phono" jack. Set the radio volume and tone controls as described above. Set the recording level and proceed as described under "To Record From Microphone".

3. Have a shielded cable with a two conductor phone plug on one end and the other end connected across the radio volume control. Insert the phone plug into the "Radio-Phono" jack. Set the recording level and proceed with the recording as described under "To Record From Microphone". The position of the radio volume and tone controls has no effect on this set up and may be set anywhere.

To Record From Phonograph-

1. If the phonograph being used has a phone type plug on the pickup leads, insert it into the "Radio-Phono" jack. Set the recording level and proceed with the recording as described under "To Record From Microphone".

2. If the phonograph has a standard pin type plug which is more common, an adaptor is needed. Insert the pin plug into the adaptor and plug the adaptor into the "Radio-Phono" jack.

IMPORTANT: The recorder will not record from microphone or play back while a plug is inserted in the "Radio-Phono" jack.

To Record From Television Receiver-

1. Use one of the three methods described under "To Record From Radio" and proceed with the recording as described under "To Record From Microphone".

Dual Track Recording-

The Crescent is designed so that only one-half the tape width is recorded at a time; thereby resulting in two track recording. This two track operation is accomplished in the following manner:

1. After a reel of tape has been recorded, i.e. all of the tape wound on to the take-up reel, turn the play-record control (4) to idle.

2. Remove the reels from the recorder, turning the full reel over and placing it on the right reel plate (7) and the empty reel on the left reel plate (2).

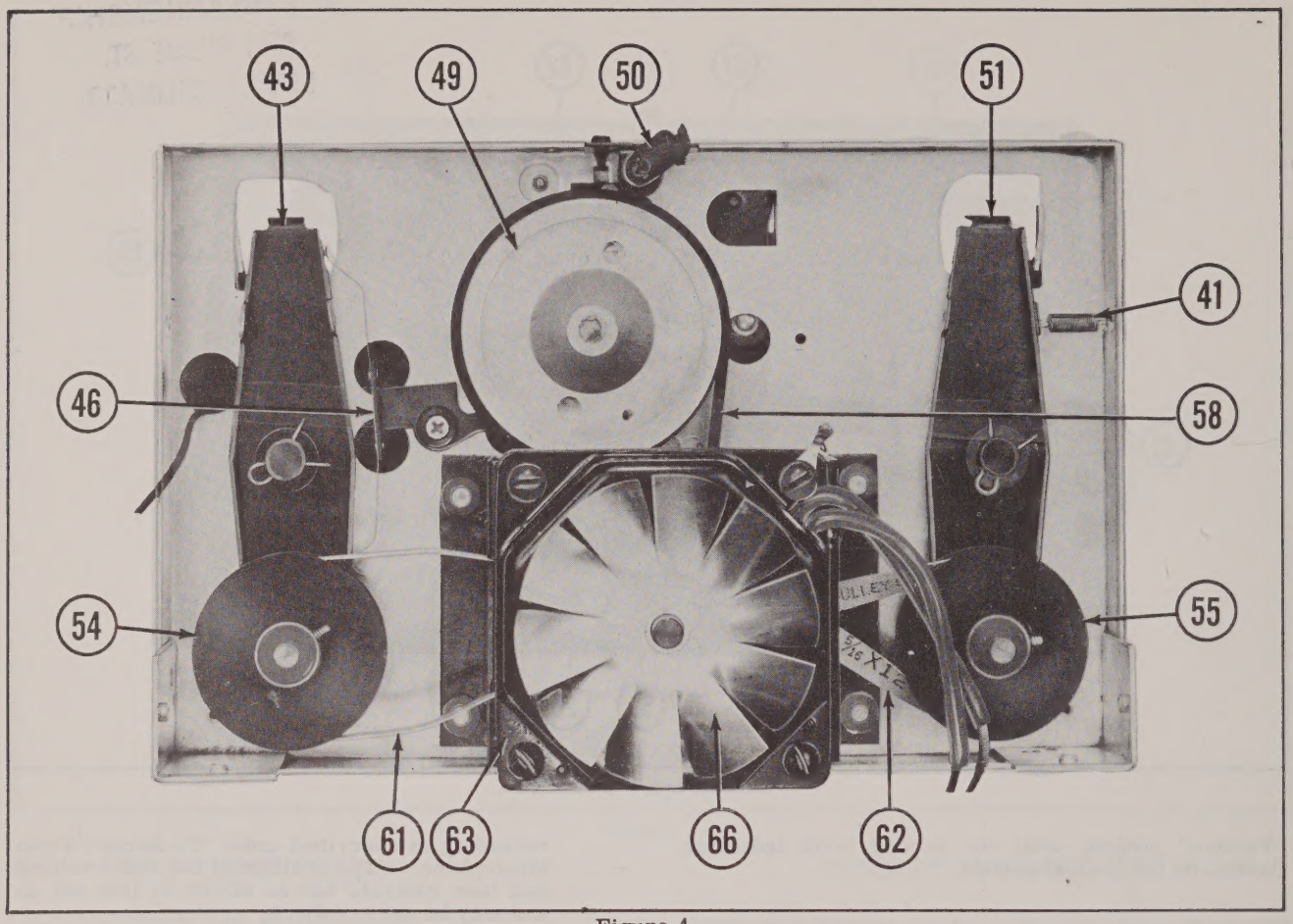

Figure 4

3. Properly thread the tape and proceed with the recording.

4. After this track has been recorded the first track of recording is ready to be played without rewinding, by reversing the reels as described in step 2 above.

Fast Forward And Fast Rewind-

High-speed forward or reverse can be obtained by pressing the desired knob (9 or 10) toward the head cover. Movement of these controls will wind the tape on the desired reel at a high speed as long as the control is held in this position. These are used primarily in locating a desired portion of a recording in a few seconds.

CAUTION: Do not attempt "Fast Forward" or "Fast Rewind" with the play-record control (4) on anything but idle position, as damage to the unit or breaking of the tape may result.

Braking-

The Crescent is equipped with a quick stop when in high speed, either direction. Move both "Fast Forward" and "Fast Rewind" controls toward the head cover and then release both at the same time. For example: when in fast forward speed, continue to hold control and with the other hand move "Fast Rewind" control toward head cover. When machine stops, release both controls at the same time. If a coasting stop is desired, release control in motion and tape will glide to a momentum stop.

To Play A Recording-

1. Thread tape as described under "Threading the Tape".

2. Turn play-record control (4) clockwise without depressing until it locks.

3. Adjust the "Volume" and "Tone" controls for desired listening level.

To Use An Ext. Speaker-

For Model 2900, plug the external speaker thru a standard two conductor plug into the "Ext. Spkr." output jack. For Model 9037, plug the external speaker thru a three conductor phone plug into the "Output" jack.

CAUTION: Do not connect conductor plug into recorder without ext. speaker attached; as damage to recorder may result.

To Edit And Splice Tape-

NOTE: Since it is impossible to edit and splice one track without affecting the other, recordings which are to be edited should be limited to one track only.

1. The tape may be edited by cutting out unwanted portions, or by joining selections into another sequence. Announcements may be inserted between selections, etc. Unused sections of tape can be spliced together for re-use.

2. For best results, cut tape at a slight diagonal, join ends together with splicing tape on the glossy side and trim off any excessive width.

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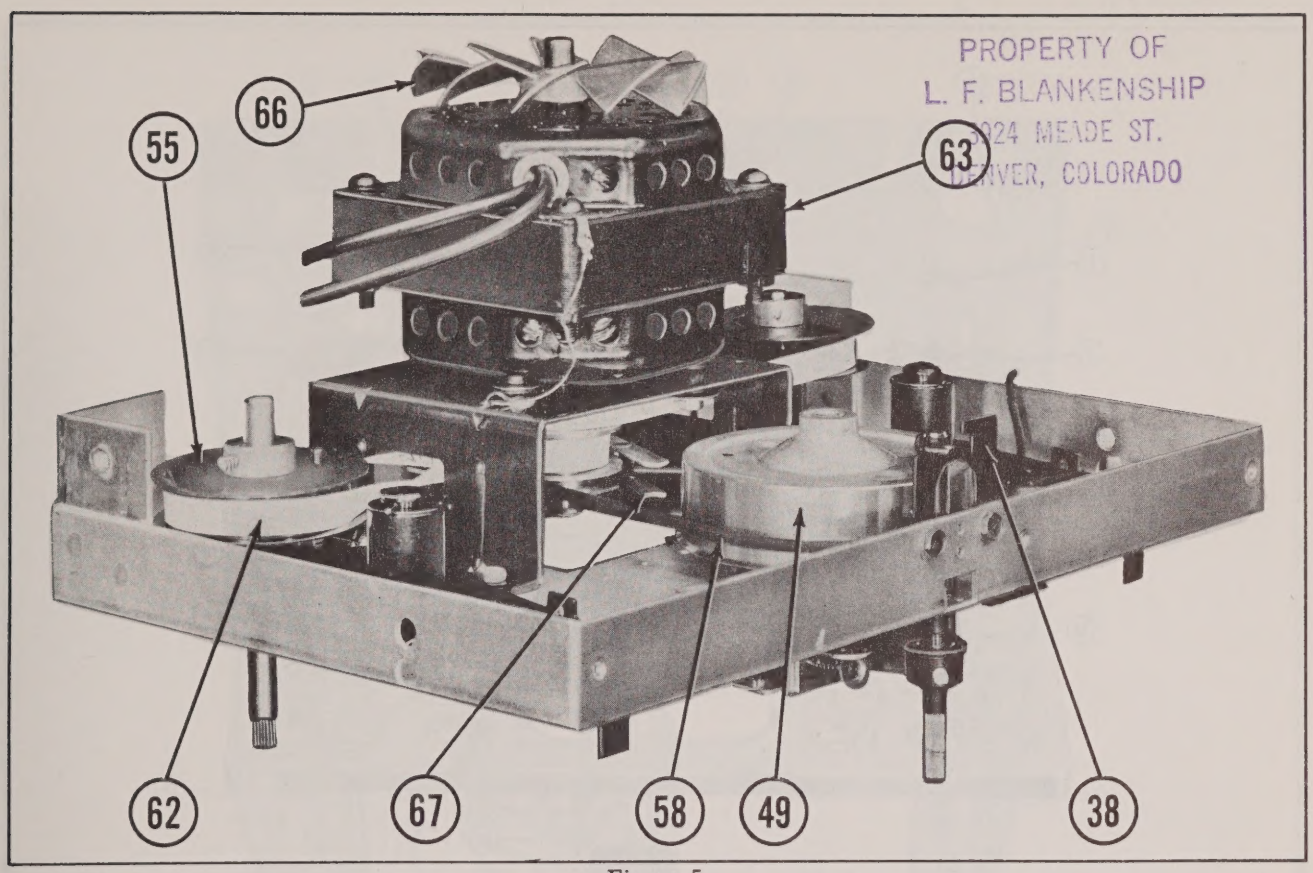


Figure 5

Erasing Recorded Material-

In the record position any recording on the tape is automatically erased before a new recording is put on the tape. If it is desired to erase a recording without putting anything on the tape follow the normal recording procedure, but leave the "Volume" control set at its extreme counterclockwise position.

To Use As A Public Address System-

1. Insert the microphone plug into the "Radio-Phono" jack.

2. Leave the play-record control (4) in idle position.

3. Speak into the microphone and adjust the "Volume" and "Tone" controls for desired level.

4. Do not have the microphone too close to the speaker or a feedback howl will result.

ADJUSTMENTS

Removing Unit From Case-

All service work except cleaning of the head and pressure roller and adjustment of the head and pressure pad assembly requires removal of the unit from the carrying case.

1. To remove unit from carrying case, disconnect power cord and remove the four Phillips head screws from bottom of case and carefully lift unit straight up and out.

Spindle (11 and 12) End Play Adjustments-

The spindles should have from 1/32" to 1/16" of up and down movement. Loosen the set screw in the pulley (54 or 55) and move the pulley up or down until the correct amount of end play is obtained.

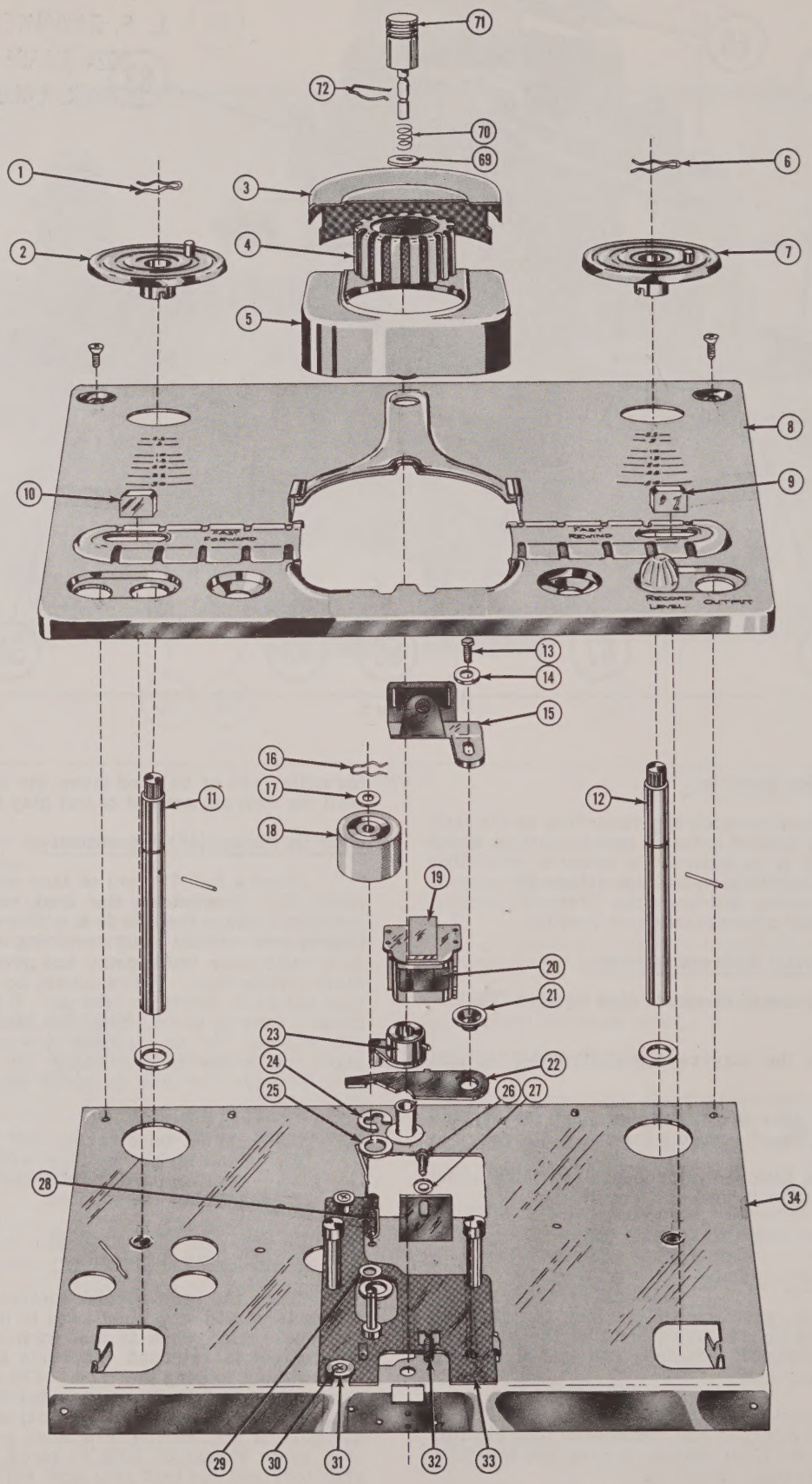
Take Up Spring (46) Adjustment-

Place a full 7" reel of tape on the take up reel plate (2). Rewind on the feed reel for about 10 seconds. Place the unit in the "Play" position. The take up reel should start revolving at the same time or a little after the capstan and pressure roller (18) start pulling tape. There should be no looping of the tape before it starts to take up. If the tape loops or doesn't take up at all, bend the take up lever spring (46) at point "A" on exploded view until the recorder takes up properly. Bending the spring outward will increase the take up while bending inward will decrease it.

CAUTION: Do not bend spring (46) to give too much take up or the tape will start to go into fast forward before the pressure roller reaches the capstan.

Take Up Reel Seat (2) And Feed Reel Seat (7) Drag Adjustment-

When the play-record control (4) is released, the reels should stop right away to prevent looping of the tape. Also when in fast forward or rewind and the control is released the reels should coast to a stop without looping the tape. The stop arms on the motorboard (point "B" on exploded view) that the take up and feed reel arms (43 and 51) rest against when the tape is not moving are what govern this. The stop arms should be bent to force the take up reel arm (43) and the feed reel arm (51) over far enough to take up enough belt tension so that the spindles just start to revolve without the reels in place. The play-record control (4) should be in its extreme counterclockwise position when making this adjustment. With the reels in place the spindles should not



A PHOTOFACT "EXPLODED" VIEW
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Figure 6A. Exploded View of Parts Above Baseplate.

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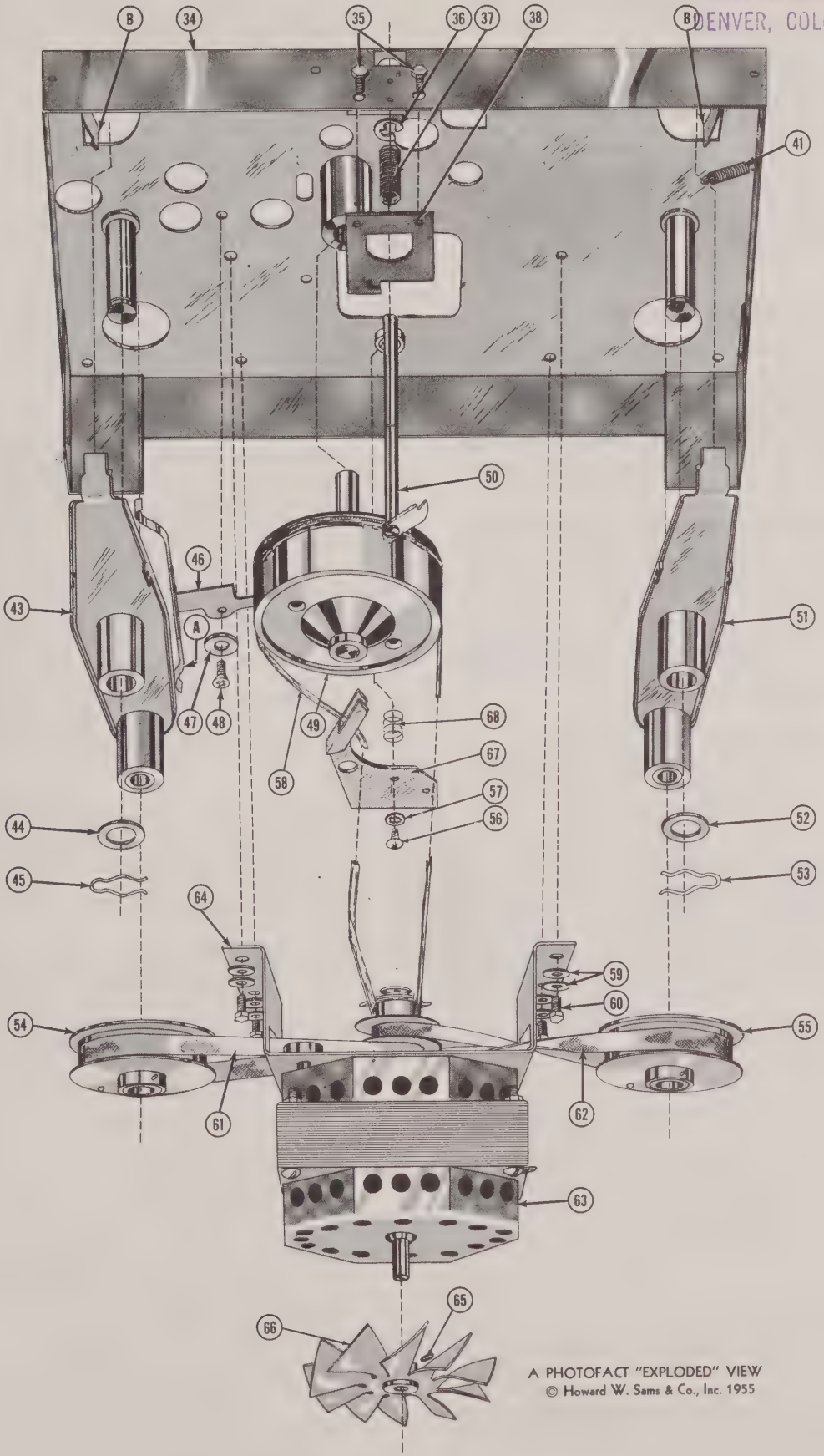

Figure 6B. Exploded View of Parts Below Baseplate.

revolve. If one or the other does, force the stop arm (point "B" on exploded view) over until it stops revolving.

Lifter Arm (23) Adjustment-

This adjusts the distance that the contact strip on the play-record switch will move when going into the record position. If an adjustment is necessary, depress and turn the play-record control (4) clockwise. Loosen the set screw in the lifter arm (23) and rotate control knob (4) to the left or right to center the contact strip with the contacts on the left end of the switch. Make sure lifter arm (23) is down as far as it will go and tighten its set screw.

Play-Record-Erase Head Adjustment-

It is very important that the head be lined up perfectly with the tape. If it is not, low output, loss of high frequencies or track overlap may result. If the head is to be replaced, the complete assembly of the head and the bracket (19) that it mounts in should be changed. The bracket is adjusted to the head and sealed in place at the factory. There are two adjustments to be made which are as follows:

1. One is the head height. This is set by placing a .179" gauge (between 11/64" and 3/16") on the motorboard (34) under where the head is mounted. The head is pushed down flush with this gauge and tightened in place and the gauge removed. If a gauge is not obtainable set the head height while the unit is pulling tape. Move the head slowly up until the top edge of the tape is hitting the edge of the tape guides on the motorboard.

2. The second adjustment is for output and frequency response. To set this make a recording of a 3000 cycle signal on a good unit. Place this on the unit that the head is to be aligned on. Connect an output meter or AC voltmeter across the speaker voice coil. Play the 3000 cycle tape, rock the head holder (19) back and forth, screw (26) holding the holder on to the motorboard bracket will allow you to do this, and notice the variation in the output voltage at the voice coil. Tighten the head holder in the position of highest output. Make sure the head was not moved up or down while rocking it. If a 3000 cycle signal tape cannot be made, record a record with some high notes on it on another unit. Play this back on the unit to be adjusted and rock the head to give best high note response.

After setting the height and output check unit for track overlap. To do this take a reel of tape that has no recording on it. Make a recording on the unit that the head has been adjusted on. Do not rewind but take the reels off, reverse them and play the other track. There should be no sound heard. If what was recorded is heard backwards then there is track overlap. If this is the case, the guide on the head holder should be bent up to move the tracks further apart.

Pressure Pad Adjustment-

This applies the correct pressure between the tape and the head. To adjust this, loosen screw (13) that holds pressure pad bracket (15). Turn play-record control (4) clockwise. Move bracket (15) forward until the pressure pad moves back against its spring 1/16". Make sure the front edge of the bracket is parallel with the head and tighten screw (13).

NOTE: When ordering a replacement head, be sure to get the complete assembly of head, plug and bracket. The bracket is adjusted to the individual head and sealed at the factory. Also, when ordering a replacement motor, be sure to get the complete assembly of motor, pulley and plug. The pulley is turned down on the individual motor and is not interchangeable.

Hum Balance Adjustment-

If tube V1 or V2 is replaced or the head changed the setting of the hum balance pot (R3) should be checked. To do this, connect an external speaker to the unit as described under "To Use An External Speaker". Connect an AC voltmeter with a .1 volt AC scale across the speaker voice coil. Turn the "Volume" and "Tone" controls clockwise. Place the play-record control (4) in "Play" position. Put the AC meter on the .1 volt scale and adjust the hum pot. (R3), which is located between tubes V1 and V2 on top of the chassis, to its minimum reading. It should not exceed .1 volt. This is the only adjustment required in the amplifier.

LUBRICATION

The lubricants applied at time of manufacture should be sufficient for a long period of time. Approximately once a year, or in the event that parts are replaced, lubricate the unit as follows:

With No. 20 Motor Oil-

1. Take up reel arm (43) bushing.
2. Feed reel arm (51) bushing.
3. Spindle (11 and 12) bearings.
4. Flywheel (49) bearings.
5. Pressure roller (18) bearing.

With Staput No. 312 grease or lubriplate-

1. Pressure plate (33) at the slide buttons and the guide on the right side.
2. On the stud of the lifter arm (23).

CAUTION: Do not oil the motor bearings unless absolutely necessary as excess oil will only be thrown off and cause slipping of the pulleys and rollers. Always use as little oil as possible. If oil should get on the pulleys and rollers wipe off with a petroleum solvent, such as alcohol. Do not use carbon tetrachloride.

TROUBLES

Won't Take Up Tape Properly-

1. Spindle (11) binding.
   (a) Lubricate.
2. Improper take up spring (46) adjustment.
   (a) See "Take Up Spring Adjustment".
3. Belt (61) slipping.
   (a) Clean motor pulley and pulley (54).
4. Belt (61) broken.
   (a) Remove bracket (64) and replace belt.
5. Set screw loose in pulley (54).
   (a) Tighten and leave 1/32" to 1/16" end play in spindle.
6. Pulley (54) broken.
   (a) Replace pulley.

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3924 MEA
DENVER, C

Fast Forward Won't Function Properly-

1. See above except for step 2.

Fast Rewind Won't Function Properly-

1. Spindle (11 or 12) binding.
   (a) Lubricate.
2. Belt (62) slipping.
   (a) Clean motor pulley and pulley (55).
3. Belt (62) broken.
   (a) Remove bracket (64) and replace belt.
4. Set screw loose in pulley (55).
   (a) Tighten and leave 1/32" to 1/16" end play in spindle.
5. Pulley (55) broken.
   (a) Replace pulley.

Speed Variation or Wow-

1. Slippage.
   (a) Clean motor pulley, flywheel and capstan (49) and pressure roller (18) with a petroleum solvent, not carbon tetrachloride. Replace rubber rollers if they appear oil soaked.
2. Too much feed reel drag.
   (a) Check adjustment as described under "Take Up Reel Seat And Feed Reel Seat Drag Adjustment".
3. Flat spot on rubber roller (18).
   (a) A rapid thumping sound while the unit is running may indicate a flat spot on the rubber tire. If this condition does not clear up after several minutes of running time, replace the roller.

   (b) If the surface of the rubber roller is not smooth and even, replace the part.

   (c) Should the bearings of the rollers show signs of excessive wear or be extremely wobbly, the rollers should be replaced.
4. Tight feed or take up spindle (11 or 12)
   (a) Check adjustment as described under "Spindle End Play Adjustment".

   (b) Lubricate.
5. Tight pressure roller (18).
   (a) Lubricate.
6. Tight flywheel shaft (49).
   (a) Lubricate.
7. Pressure pad assembly (15) applying too much pressure against tape.
   (a) Check adjustment as described under "Pressure Pad Adjustment".

Stalling or Binding-

1. Speed control setting changed while unit not turned on. This should be done only when motor is running.

   (a) With motor turned "On", try moving speed control up and down several times.

Should the above fail, try holding the fast forward control (10) to the left as far as it will go and with the other hand manually rotate take-up reel spindle (6). If binding still continues it will be necessary to remove unit from case and free any binding action.

Speed Does Not Agree With Speed Setting-

1. Broken "ears" on motor drive pulley.

   (a) Replace entire motor.

Tape Creeps Out Of Tape Slot-

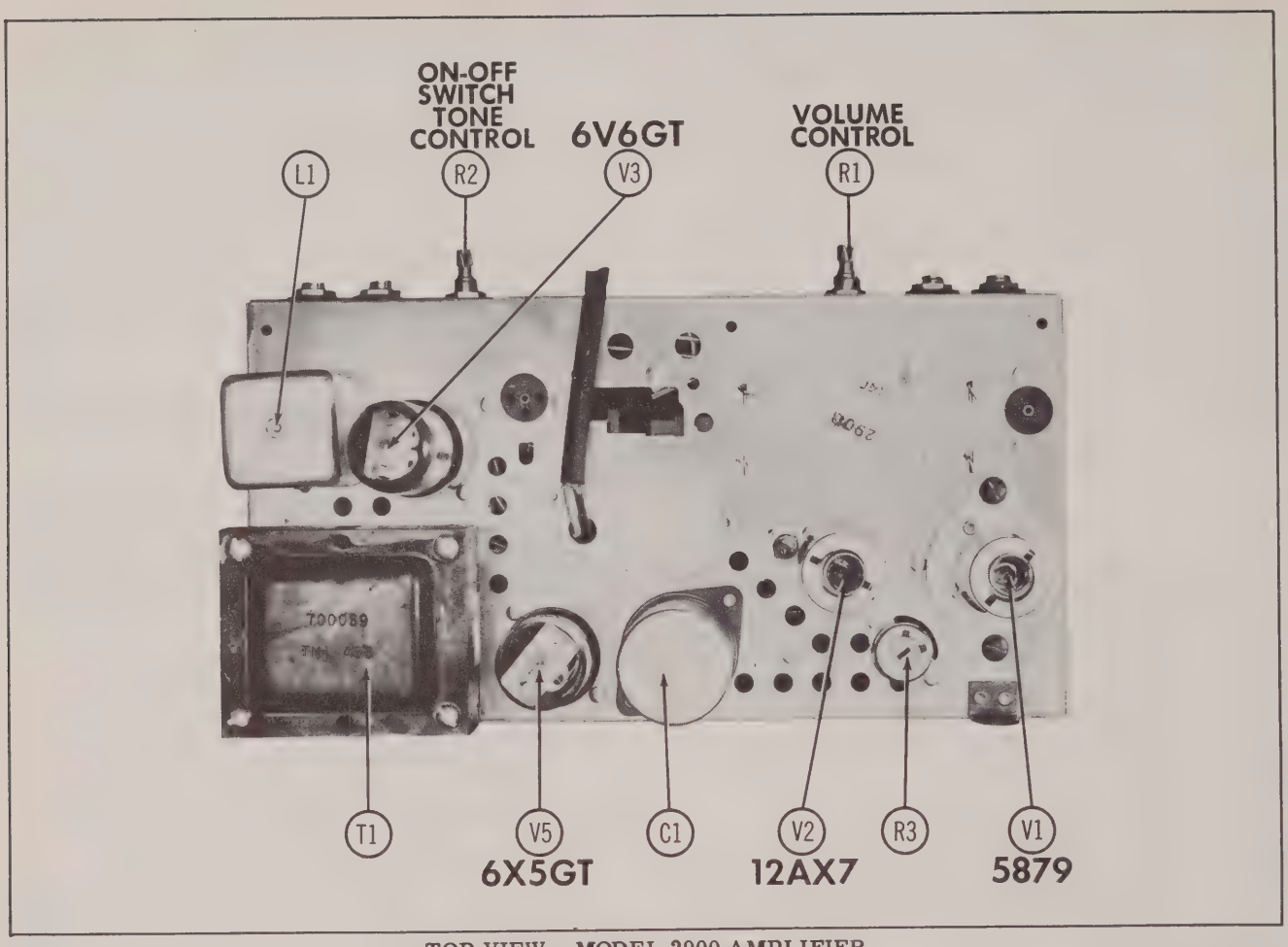
1. Head (20) improperly adjusted.

   (a) See "Play -Record -Erase Head Adjustment".

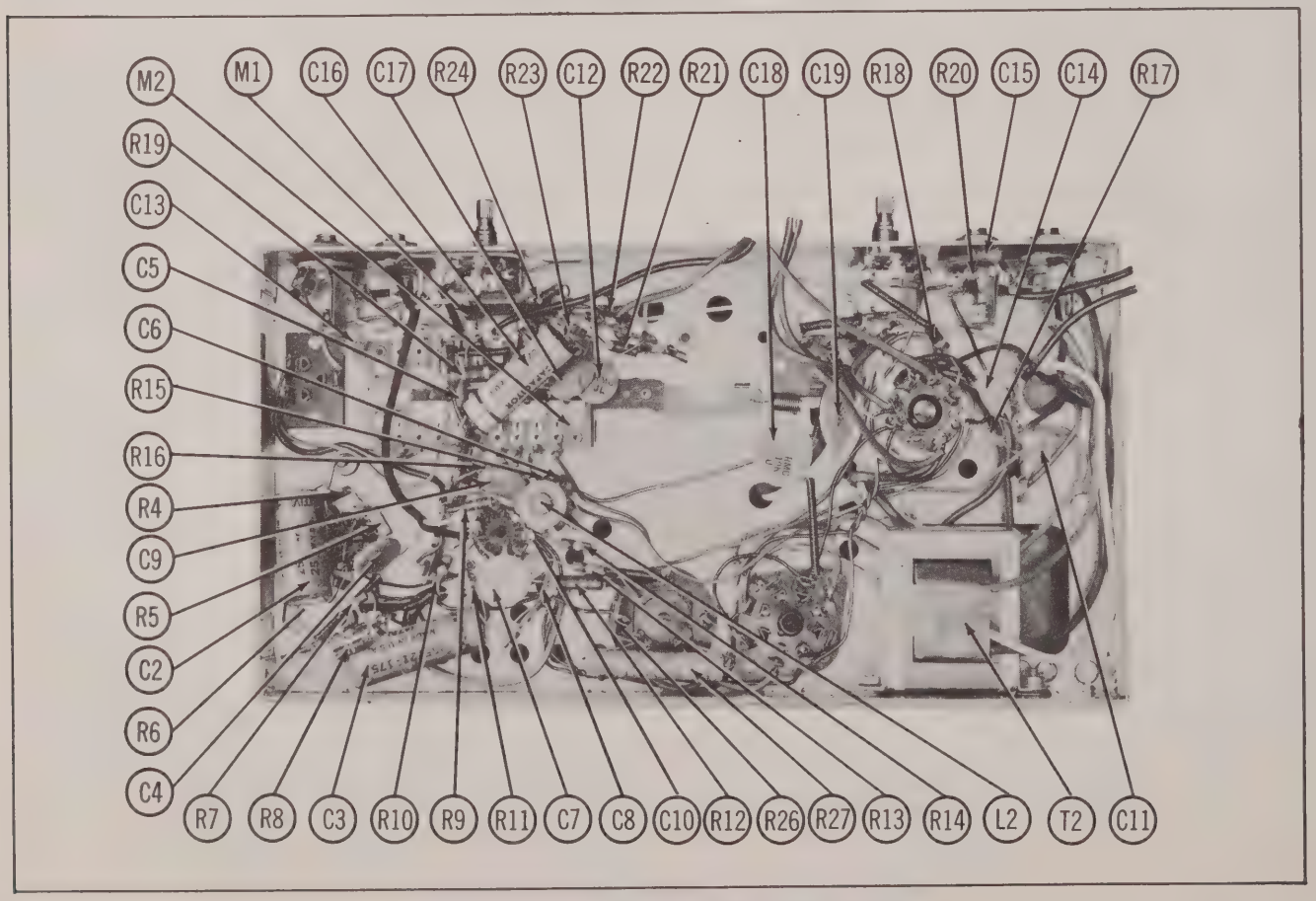
CLEANING

The record-playback head (20), capstan shaft and pressure roller (18) are subject to an accumulation of tape coating residue, which is worn off the tape as it passes these parts. This can cause distortion, weak output and poor erasure. Use a soft cloth and alcohol to clean the head surfaces, capstan and pressure roller.

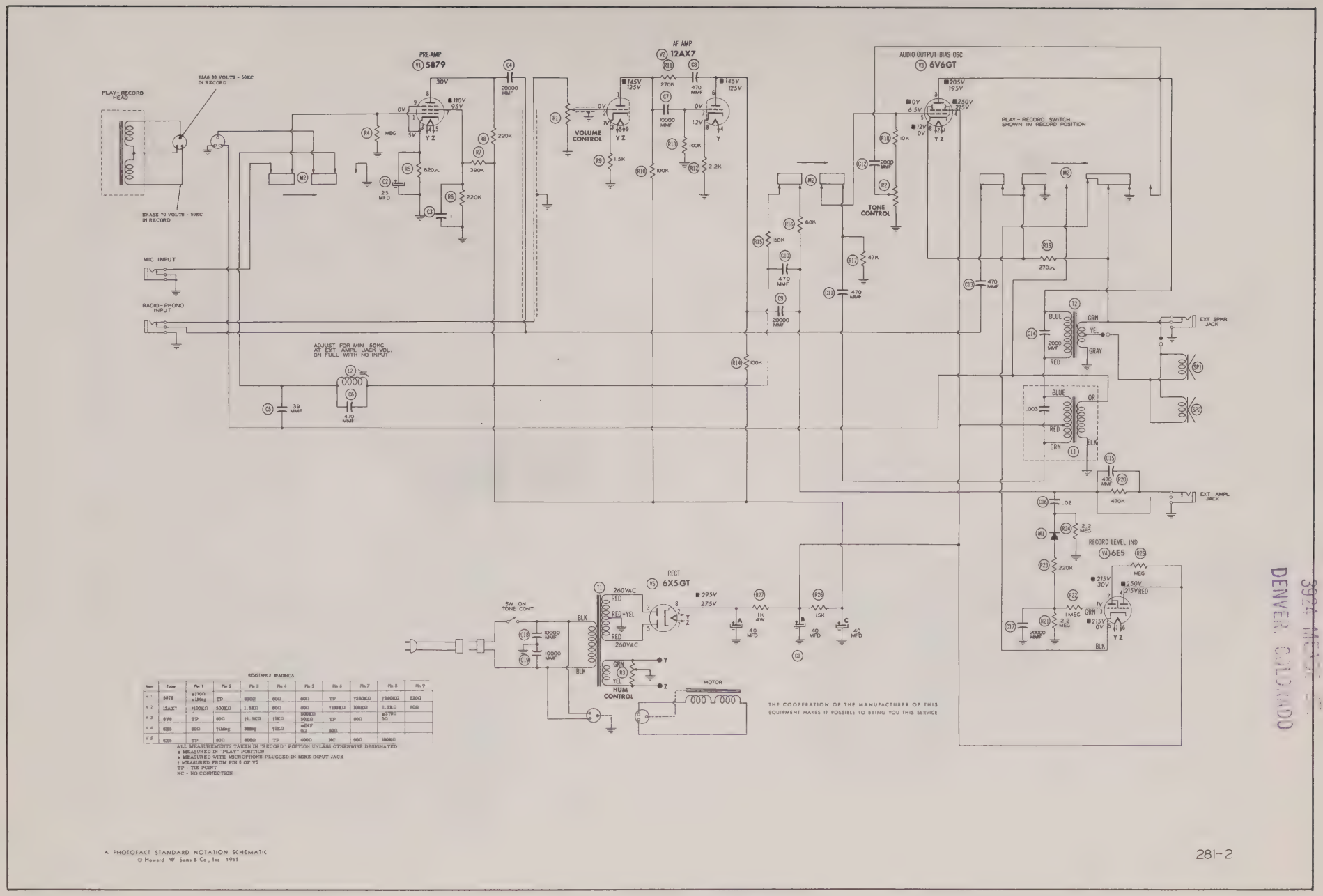
CAUTION: Do not use a brush or any metallic object when cleaning the record-playback head as this could possibly mar the head surface.



TOP VIEW - MODEL 2900 AMPLIFIER



BOTTOM VIEW - MODEL 2900 AMPLIFIER



RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V-1	5879	ø270Ω ø1Meg	TP	820Ω	60Ω	60Ω	TP	†250KΩ	†240KΩ	820Ω
V-2	12AX7	†100KΩ	500KΩ	1.5KΩ	60Ω	60Ω	†250KΩ	100KΩ	2.2KΩ	60Ω
V-3	6V6	TP	60Ω	†1.5KΩ	†1KΩ	500KΩ 50KΩ mDVP Ω	TP	60Ω	ø370Ω Ω	
V-4	6E5	60Ω	†1Meg	3Meg	†1KΩ	mDVP Ω	60Ω			
V-5	6X5	TP	60Ω	400Ω	TP	600Ω	NC	60Ω	100KΩ	

ALL MEASUREMENTS TAKEN IN "RECORD" POSITION UNLESS OTHERWISE DESIGNATED
ø MEASURED IN "PLAY" POSITION
▲ MEASURED WITH MICROPHONE PLUGGED IN MIKE INPUT JACK
† MEASURED FROM PIN 8 OF V5
TP - TIE POINT
NC - NO CONNECTION

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MODEL 2900 AMPLIFIER SCHEMATIC

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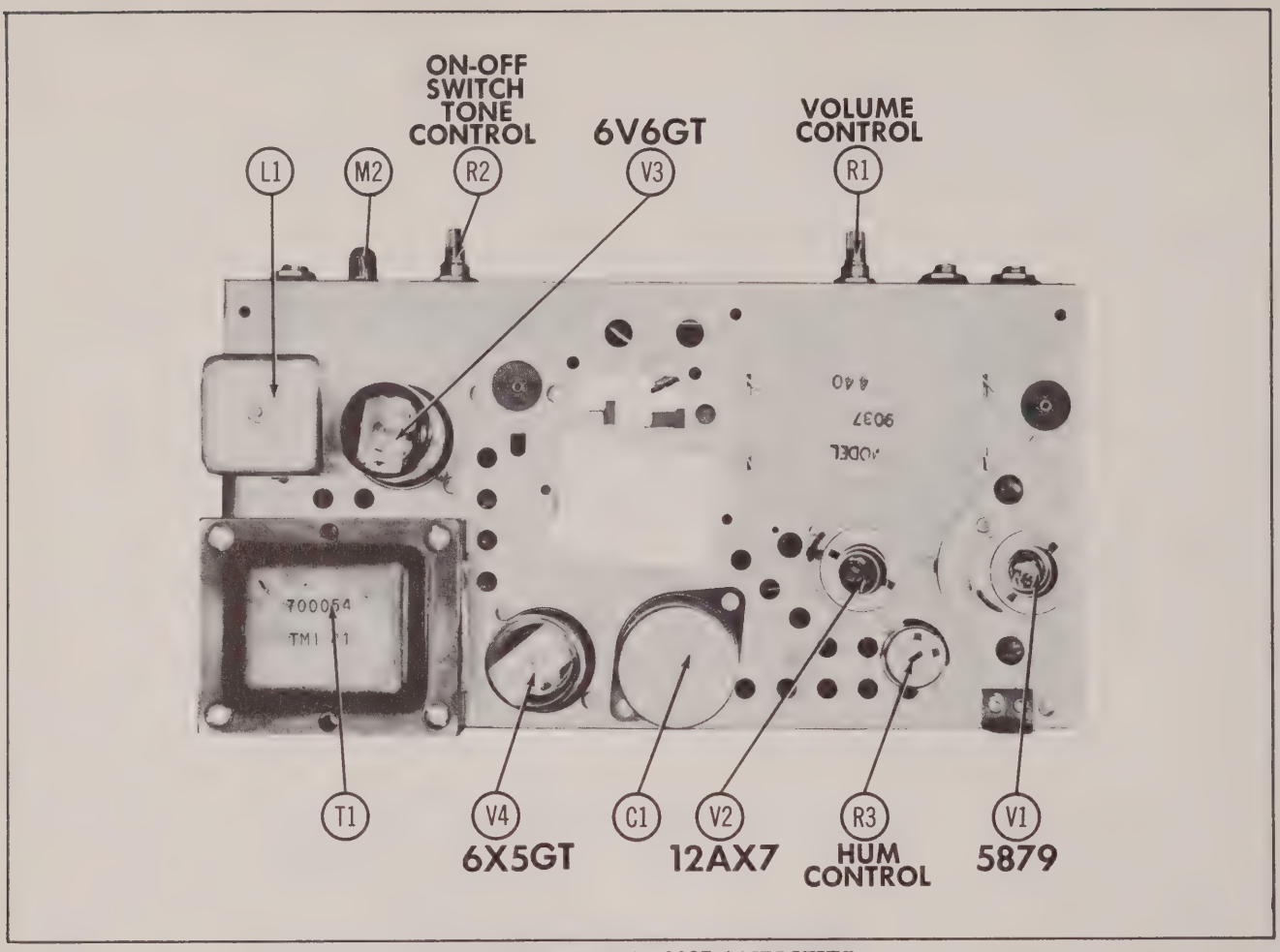
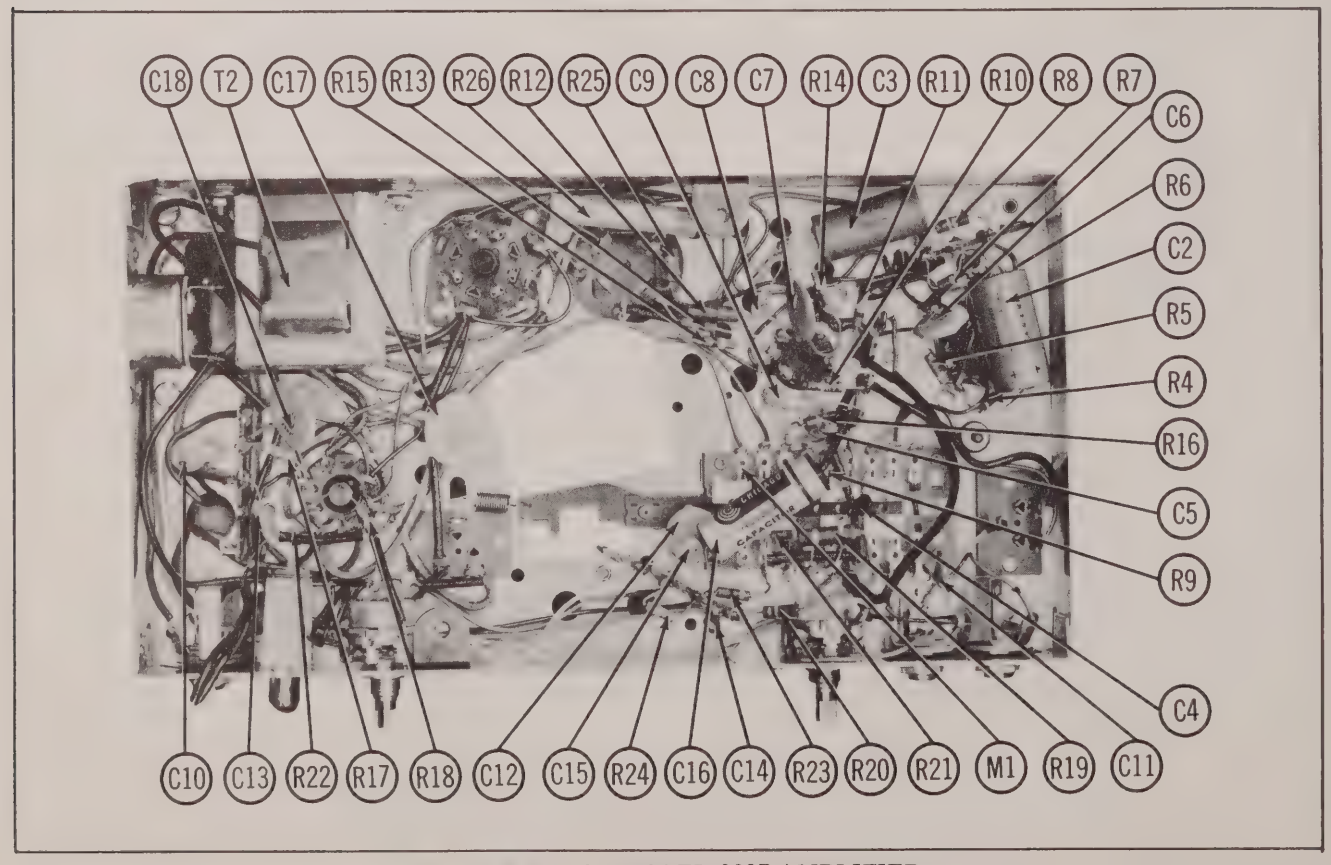


TOP VIEW - MODEL 9037 AMPLIFIER



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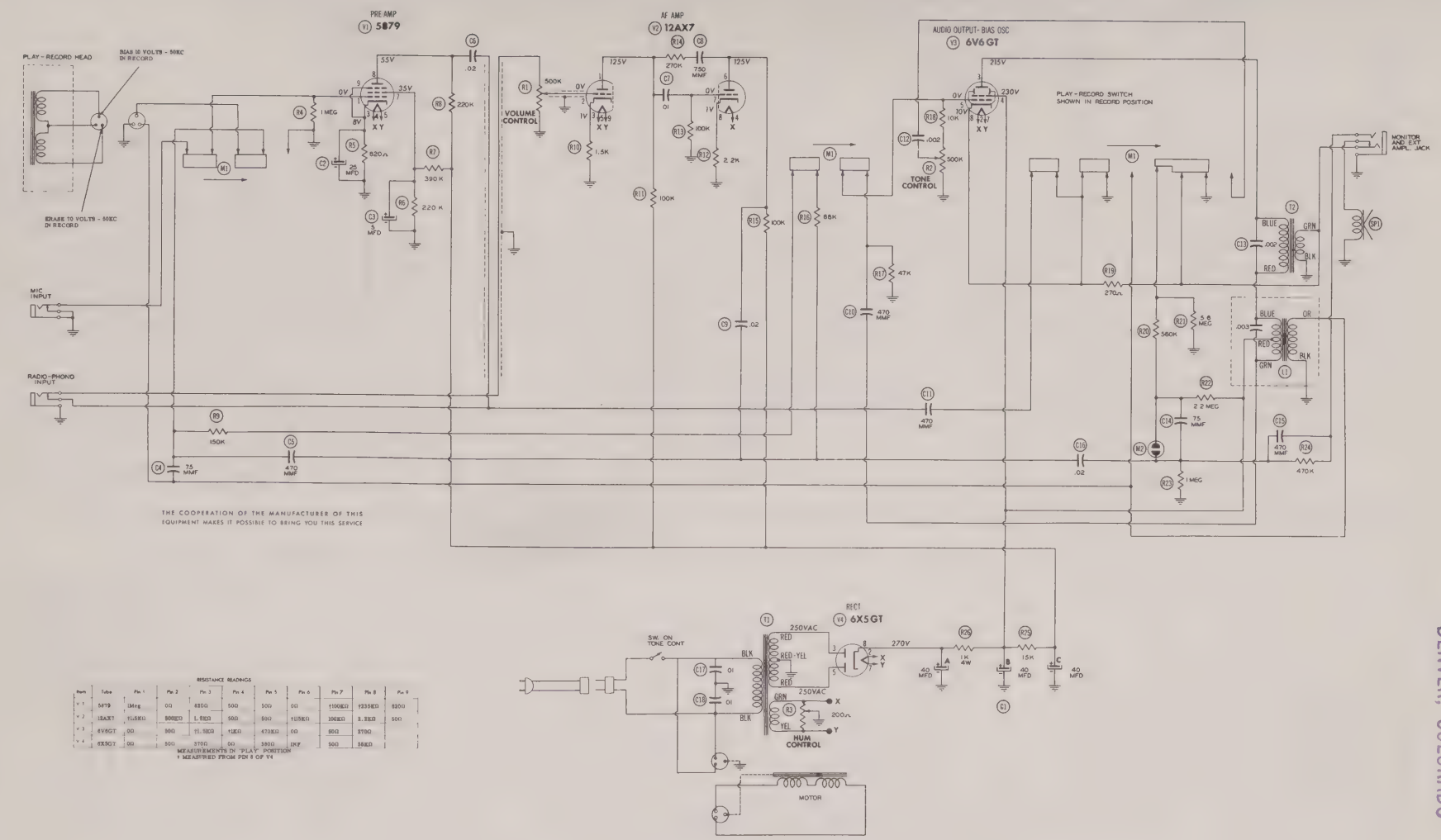

MODEL 9037 AMPLIFIER SCHEMATIC

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MECHANICAL PARTS LIST

Ref. No.	Part No.	Description
1	460112	Hairpin Clip
2	310204	Reel Plate (Red)
3	100672	Head Cover (Model 2900)
	100767	Head Cover (Model 9037)
4	310201	Mechanism Control Knob
5	100687	Cover
6	460112	Hairpin Clip
7	310204	Reel Plate (Red)
8	450070	Top Plate
9	310205	Rewind Control Knob (Red)
10	310205	Fast Forward Control Knob (Red)
11	011319	Spindle (Includes Roll Pin)
12	011319	Spindle (Includes Roll Pin)
13	600180	Screw, #6-32x5/16 Hex. Hd.
14		Flat Washer, .142x5/16x1/32
15	011315	Pressure Bracket
16	460111	Hairpin Clip
17	580143	Cloth Washer
18	011236	Pressure Roller
19	100556	Head Holder
20	011311	Play-Record-Erase Head, Head Holder, Cable and Plug Assembly
21	200288	Slide Button Spacer Washer
22	100658	Tension Arm
23	011722	Lifter Arm & Set Screw Assembly
24	460018	Flywheel Retainer
25	580141	Flat Washer
26	600113	Screw, 8-32x5/16 Hex. Hd.
27	580056	Flat Washer
28	420105	Pressure Plate Return Spring
29	580143	Cloth Washer
30	600243	Phillips Flat Hd. M. S., 6-32x1/4
31	200288	Slide Button
32	420110	Tension Arm Spring
33	011821	Pressure Plate; includes Pressure Roller Stud, Bearing Spring and Tape Guide Studs
	011314	Pressure Plate; includes Pressure Roller Stud, Bearing Spring, but does not include Tape Guide Studs
34	011690	Base Plate; includes staked and riveted parts
35	600111	Hex. Hd. M. S., #6-32x1/4
36	460117	Control Shaft Retainer
37	420109	Record Release Spring
38	100660	Control Shaft Bracket
41	420107	Spindle Arm Spring
43	011329	Take-up Arm Assembly
44	580156	Steel Washer
45	460110	Hairpin Clip
46	011328	Take-up Lever & Spring Assembly
47	200288	Slide Button
48	600243	Phillips Flat Hd. M. S., 6-32x1/4
49	011694	Flywheel & Capstan Shaft Assembly
50	011308	Control Shaft & Lever Assembly
51	011330	Rewind Arm
52	580156	Steel Washer
53	460110	Hairpin Clip
54	011317	Pulley & Set Screw Assembly
55	011317	Pulley & Set Screw Assembly
56		Screw
57		Lockwasher
58	490087	Rubber Belt
59	580056	Flat Washer
60	600137	Hex. Hd. M. S., 8-32x1/4
61	490053	Take-up Drive Belt
62	490053	Rewind Drive Belt
63	011692	Motor, Pulley, Cable and Plug
64	100654	Motor Mounting Bracket
65	600153	"Allen" Set Screw, 8-32x3/16
66	011321	Motor Fan; includes Set Screw
67	100760	Speed Control Bracket
68	420151	Speed Control Spring (Lower)
69	320054	Rubber Washer
70	420151	Speed Control Spring (Upper)
71	011693	Speed Control Knob
72	420152	Speed Control Shaft Retainer

ELECTRICAL PARTS LIST

Model 2900

Ref. No.	Part. No.	Description
V1	730031	5879, Pre Amp
V2	730022	12AX7, AF Amp
V3	730004	6V6GT, Audio Output-Bias Osc.
V4		6E5, Record Level Ind
V5	730005	6X5GT, Rectifier
C1A	770088	Elect. Cap., 40MFD @ 300V.
C1B		Elect. Cap., 40MFD @ 300V.
C1C		Elect. Cap., 40MFD @ 300V.
C2	770003	Elect. Cap., 25MFD @ 25V.
C3		Cap Paper, .1MFD @ 400V.
C4	770095	Cap Ceramic Disc, 20000MMF @ 500V.
C5		Cap Ceramic Disc, 39MMF
C6	770090	Cap Ceramic Disc, 470MMF @ 400V.
C7	770096	Cap Ceramic Disc, 10000MMF @ 400V.
C8	770090	Cap Ceramic Disc, 470MMF @ 400V.
C9	770095	Cap Ceramic Disc, 20000MMF @ 500V.
C10	770090	Cap Ceramic Disc, 470MMF @ 400V.
C11	770090	Cap Ceramic Disc, 470MMF @ 400V.
C12	770093	Cap Ceramic Disc, 2000MMF @ 400V.
C13	770090	Cap Ceramic Disc, 470MMF @ 400V.
C14	770093	Cap Ceramic Disc, 2000MMF @ 400V.
C15	770090	Cap Moulded Tube, 470MMF @ 400V.
C16		Cap Moulded Paper, .02MFD @ 600V.
C17	770095	Cap Ceramic Disc, 20000MMF @ 500V.
C18	770096	Cap Ceramic Disc, 10000MMF @ 400V.
C19	770096	Cap Ceramic Disc, 10000MMF @ 400V.
R1	740051	Volume Cont., 500K
R2	740052	Tone Cont. & Sw., 500K
R3	740053	Hum Control, 200Ω W. W.
R4	760001	Resistor, 1Meg. @ 1/2 W.
R5	760025	Resistor, 820Ω @ 1/2 W.
R6	760015	Resistor, 220K @ 1/2 W.
R7	760048	Resistor, 390K @ 1/2 W.
R8	760015	Resistor, 220K @ 1/2 W.
R9	760003	Resistor, 1.5K @ 1/2 W.
R10	760010	Resistor, 100K @ 1/2 W.
R11	760052	Resistor, 270K @ 1/2 W.
R12	760047	Resistor, 2.2K @ 1/2 W.
R13	760010	Resistor, 100K @ 1/2 W.
R14	760010	Resistor, 100K @ 1/2 W.
R15		Resistor, 150K @ 1/2 W.
R16		Resistor, 68K @ 1/2 W.

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ELECTRICAL PARTS LIST-Con't

Model 2900

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
R17	760013	Resistor, 47K@1/2 W.	R27	760304	Resistor, 1K@4 W.,W. W.
R18		Resistor, 10K@1/2 W.	L1	700056	Osc. Coil
R19	760115	Resistor, 270Ω@1/2 W.	L2		Filter
R20	760037	Resistor, 470K@1/2 W.	M1		Crystal Diode
R21	760040	Resistor, 2.2Meg. @1/2 W.	M2		Play-Record Slide Switch
R22	760001	Resistor, 1 Meg. @1/2 W.	T1	700054	Power Transformer
R23	760015	Resistor, 220K@1/2 W.	T2	700055	Output, Transformer
R24	760040	Resistor, 2.2Meg. @1/2 W.	SP1		Speaker
R25	760001	Resistor, 1 Meg. @1/2 W.	SP2		Speaker
R26	760027	Resistor, 15K@1/2 W.			

ELECTRICAL PARTS LIST

Model 9037

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
V1	730031	5879, Pre-Amp	C17	770096	Cap. Ceramic Disc, .01MFD@400V.
V2	730022	12AX7, AF Amp	C18	770096	Cap. Ceramic Disc, .01MFD@400V.
V3	730004	6V6GT, Audio Output-Bias Osc	R1	740051	Volume Cont, 500K
V4	730005	6X5, Rectifier	R2	740052	Tone Cont & Sw., 500K
C1A	770088	Elect. Cap., 40MFD@300V.	R3	740053	Hum Cont., 200ΩW. W.
C1B		Elect. Cap., 40MFD@300V.	R4	760001	Resistor, 1Meg@1/2 W.
C1C		Elect. Cap., 40MFD@300V.	R5	760025	Resistor, 820Ω@1/2 W.
C2	770033	Elect. Cap., 25MFD@25V.	R6	760015	Resistor, 220K@1/2 W.
C3	770074	Elect. Cap., 5MFD@150V.	R7	760048	Resistor, 390K@1/2 W.
C4	770097	Cap. Ceramic Disc, 75MMF±10% 400V.	R8	760015	Resistor, 220K@1/2 W.
			R9		Resistor, 150K@1/2 W.
C5	770090	Cap. Ceramic Disc, 470MMF±10% 400V.	R10	760003	Resistor, 1.5K@1/2 W.
			R11	760010	Resistor, 100K@1/2 W.
C6	770095	Cap. Ceramic Disc, .02MFD±20% 500V.	R12	760047	Resistor, 2.2K@1/2 W.
			R13	760010	Resistor, 100K@1/2 W.
C7	770096	Cap. Ceramic Disc, .01MFD±20% 400V.	R14	760052	Resistor, 270K@1/2 W.
			R15	760010	Resistor, 100K@1/2 W.
C8	770094	Cap. Ceramic Disc, .750MMF±10% 400V.	R16		Resistor, 68K@1/2 W.
			R17	760013	Resistor, 47K@1/2 W.
C9	770095	Cap. Ceramic Disc, .02MFD±20% 400V.	R18		Resistor, 10K@1/2 W.
			R19	760052	Resistor, 270Ω@1/2 W.
C10	770090	Cap. Ceramic Disc, 470MMF±10% 400V.	R20	760039	Resistor, 560K@1/2 W.
			R21	760054	Resistor, 5.6Meg@1/2 W.
C11	770090	Cap. Ceramic Disc, 470MMF±10% 400V.	R22	760040	Resistor, 2.2Meg@1/2 W.
			R23	760001	Resistor, 1Meg@1/2 W.
C12	770093	Cap. Ceramic Disc, .002MFD±20% 400V.	R24	760037	Resistor, 470K@1/2 W.
			R25	760027	Resistor, 15K@1/2 W.
C13	770093	Cap. Ceramic Disc, .002MFD±20% 400V.	R26	760304	Resistor, 1K@4 W.
			T1	700054	Power Transformer
C14	770097	Cap. Ceramic Disc, .75MMF±10% 400V.	T2	700055	Output Transformer
			L1	700056	Osc. Coil
C15	770090	Cap. Ceramic Disc, .470MMF±10% 400V.	M1	011301	Play-Record Switch
			M2	730006	Record Level, Lamp, Neon NE51
C16		Cap. Moulded Paper, .02MFD@ 600V.	SP1	011298	PM Speaker 5 1/4"

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MODEL 21K1

FADA MODELS 17KD, 17L1, 17L2, EB, LO, 21KA, 21K1, LO, 21L1, 21L2, EB, LO, 21L3, BM, 21T10, V221TBM

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*TRADE MARK

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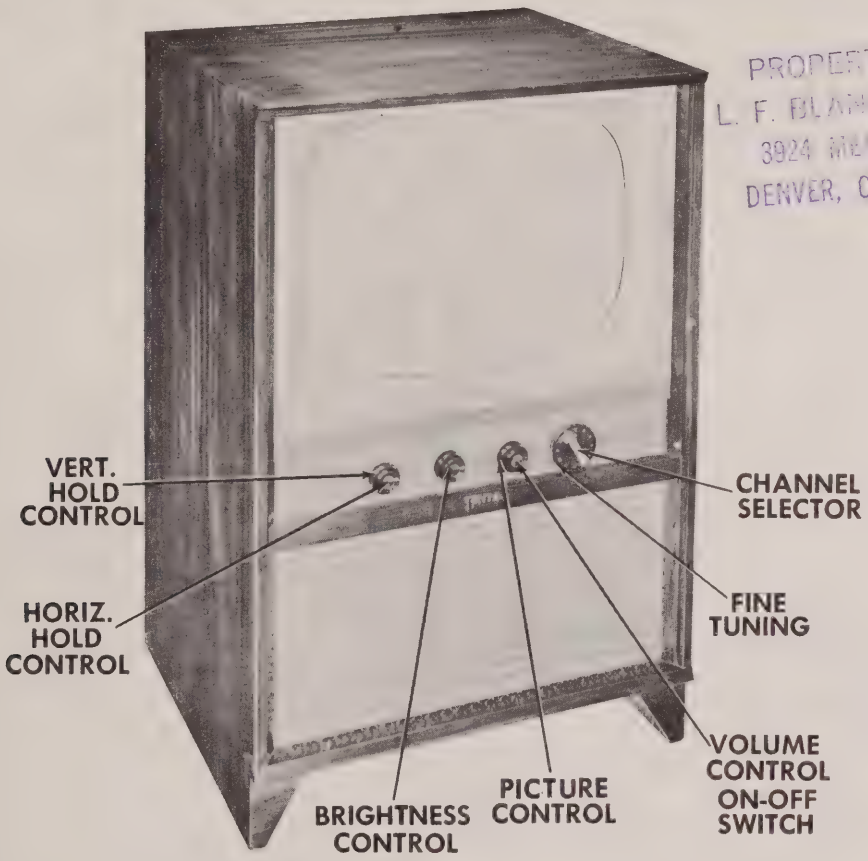

FADA MODEL 21K1

TRADE NAME	Fada MODELS 17KD, 17L1, 17L2, 17L2EB, 17L2LO, 21KA, 21K1, 21K1LO, 21L1, 21L2, 21L2EB, 21L2LO, 21L3, 21L3BM, 21T10, V221TBM
MANUFACTURER	Fada Radio & Electronics Co., Inc., 525 Main St., Belleville, N.J.
TYPE SET	Television Receiver
TUBES	Seventeen
POWER SUPPLY	110-120 Volts AC-60 Cycles RATING 1.32 Amp. @ 117 Volts AC
TUNING RANG E	Channels 2 thru 13, Video IF 26.1MC, Sound IF 21.6MC (Intercarrier)

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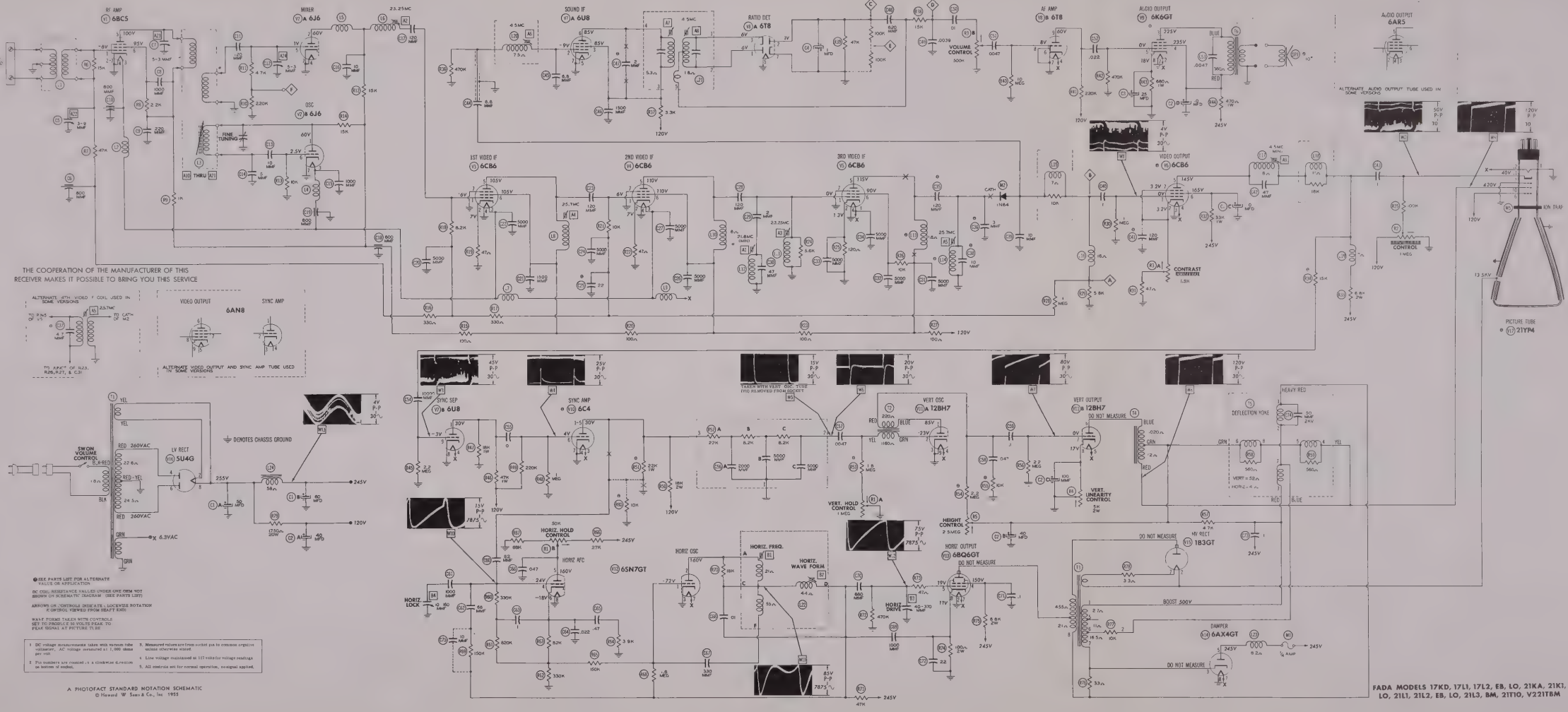
DATE 6-55 SET 281 FOLDER 3

FADA MODELS 17KD, 17L1, 17L2, EB, LO, 21KA, 21K1, LO, 21L1, 21L2, EB, LO, 21L3, BM, 21T10, V221TBM


RF AMP V1 6BC5
MIXER V7A 6J6
OSC V2B 6J6
SOUND IF V7A 6U8
RATIO DET V9A 6T8
AF AMP V9B 6T8
AUDIO OUTPUT V8 6K6GT
AUDIO OUTPUT 6AR5
ALTERNATE AUDIO OUTPUT TUBE USED IN SOME VERSIONS
1ST VIDEO IF V6A 6CB6
2ND VIDEO IF V6B 6CB6
3RD VIDEO IF V5 6CB6
VIDEO OUTPUT V6B 6CB6
PICTURE TUBE V11 21YP4
ION TRAP
CONTRAST CONTROL 1.5M
BRIGHTNESS CONTROL 1 MEG
VOLUME CONTROL 500K
FINE TUNING
ANT. TRIM SCHS
THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE
ALTERNATE 4TH VIDEO F COIL USED IN SOME VERSIONS
VIDEO OUTPUT
SYNC AMP
6AN8
ALTERNATE VIDEO OUTPUT AND SYNC AMP TUBE USED IN SOME VERSIONS
SYNC SEP V7B 6U8
SYNC AMP V10 6C4
VERT OSC V11A 12BH7
VERT OUTPUT V11B 12BH7
DO NOT MEASURE
VERT. LINEARITY CONTROL
VERT. HOLD CONTROL 1 MEG
HEIGHT CONTROL 2.5 MEG
DEFLECTION YOKE
HORIZ. HOLD CONTROL
HORIZ AFC
HORIZ OSC V12 6SN7GT
HORIZ. FREQ.
HORIZ. WAVE FORM
HORIZ OUTPUT V13 6BQ6GT
HORIZ DRIVE
HORIZ LOCK
HV RECT V15 1B3GT
DAMPER V14 6AX4GT
BOOST 500V
LV RECT V16 5U4G
S-W ON VOLUME CONTROL
DENOTES CHASSIS GROUND
6.3VAC
255V
245V
120V
SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION
DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM (SEE PARTS LIST)
ARROWS OR 'CONTROLS INDICATE CLOCKWISE ROTATION OF CONTROL VIEWED FROM SHAFT END)
WAVE FORMS TAKEN WITH CONTROLS SET TO PRODUCE 50 VOLTS PEAK TO PEAK SIGNAL AT PICTURE TUBE
1. DC voltage measurements taken with vacuum tube voltmeter, AC voltage measured at 1,000 ohms per volt.
2. Pin numbers are counted in a clockwise direction on bottom of socket.
3. Measured values are from socket pin to common negative unless otherwise stated.
4. Line voltage maintained at 117 volts for voltage readings
5. All controls set for normal operation, no signal applied.
A PHOTOFACT STANDARD NOTATION SCHEMATIC
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FADA MODELS 17KD, 17L1, 17L2, EB, LO, 21KA, 21K1, LO, 21L1, 21L2, EB, LO, 21L3, BM, 21T10, V221TBM

FADA MODELS 17KD, 17L1, 17L2, EB, LO, 21KA, 21K1, LO, 21L1, 21L2, EB, LO, 21L3, BM, 21T10, V221TBM

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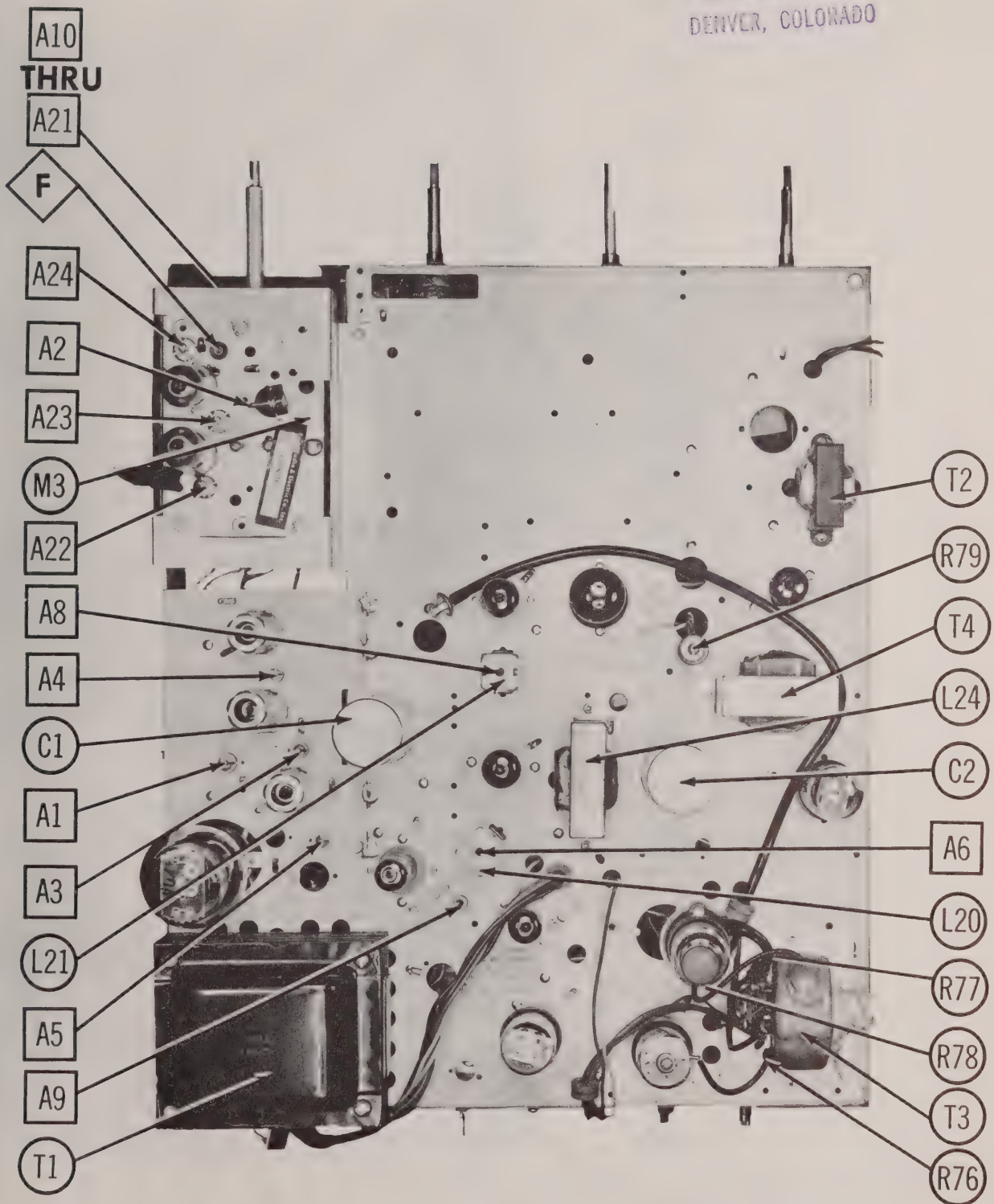
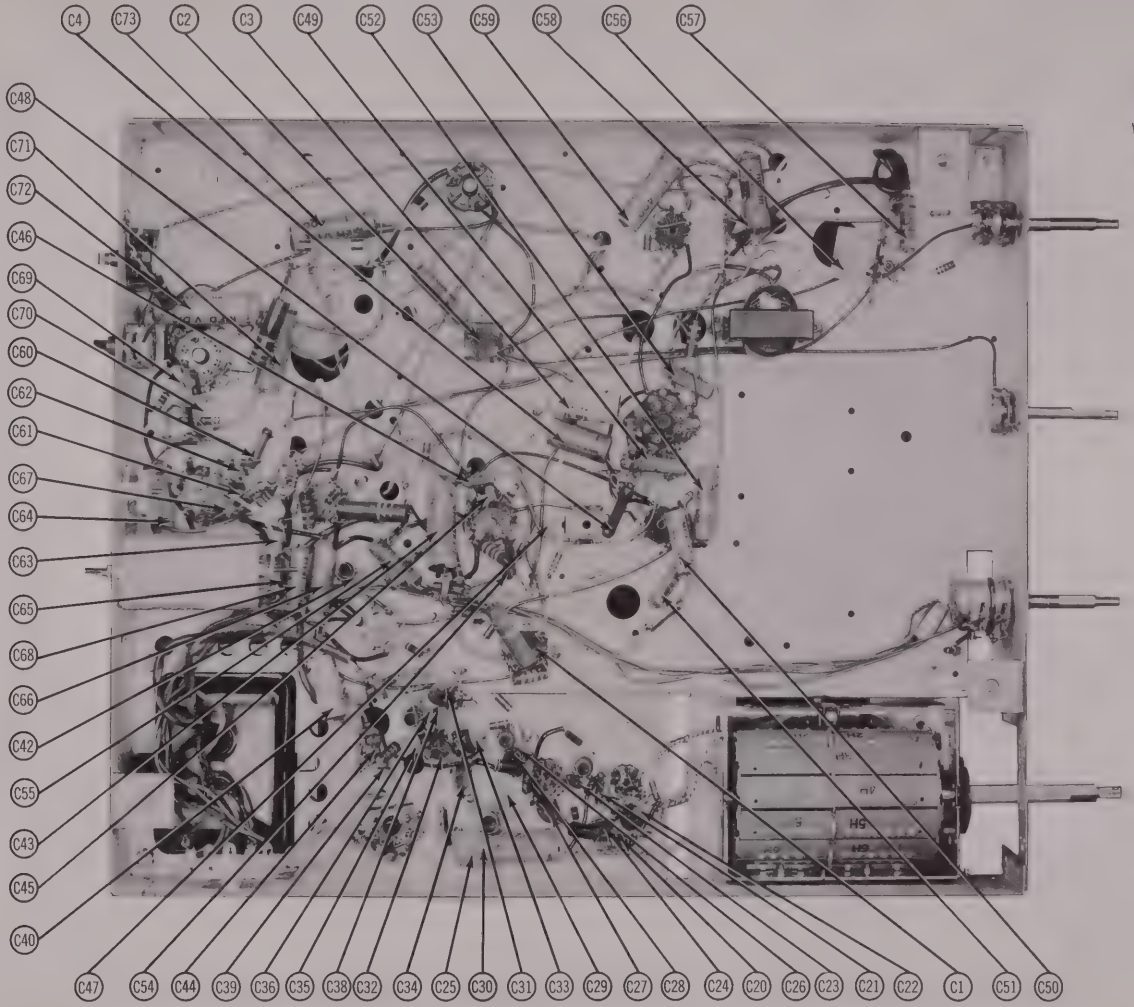
8001 MEADE ST.
DENVER, COLORADO



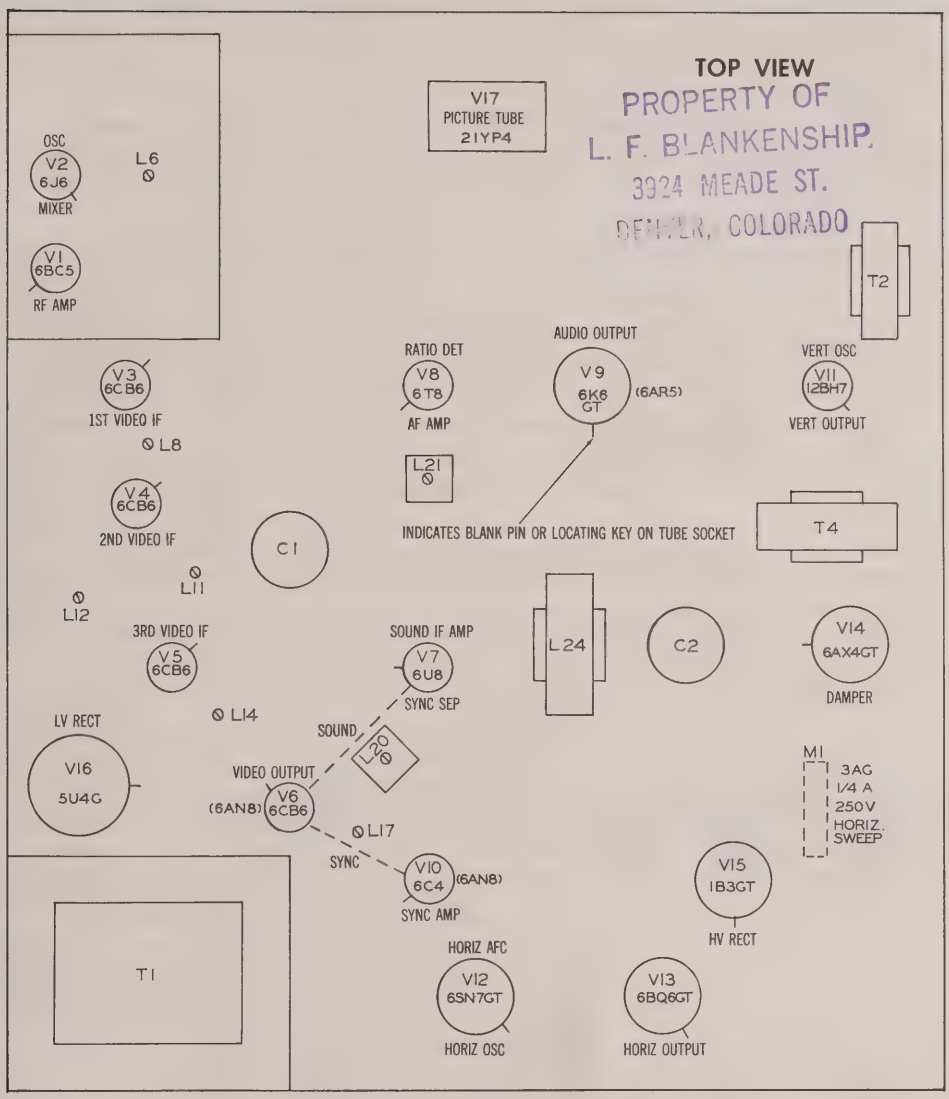
CHASSIS TOP VIEW

SET 281 FOLDER 3



CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

TUBE PLACEMENT CHART



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TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound - V16

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - V2, V3, V4, V5
No pic, no sound, has snow - V1, V2, V3
No pic, has sound, has raster - V6, V17
Has pic, no sound - V7, V8, V9

SYNC FAILURE
No vert. sync - V10, V11
No horiz. sync - V10, V12
No vert. or horiz. sync - V7, V10

SWEEP FAILURE
No raster, has sound - V12, V13, V14, V15, V17, Fuse (M1)
No vertical deflection - V11
Poor vert. linearity or foldover - V11
Poor horiz. linearity or foldover - V12, V13, V14
Narrow picture - V12, V13, V14, V5, V16
Vert. off freq. - V10, V11
Horiz. off freq. - V10, V12

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

The high voltage lead should be taped and kept away from chassis. Do not remove the horizontal oscillator tube (V12) to disable the high voltage.

VIDEO IF ALIGNMENT

Remove the converter tube (V2) from its socket and replace with a 6J6 which has pin 1 removed. This will disable the local oscillator and reduce the possibility of erroneous indications.
Set the contrast control for minimum contrast position.
Connect the negative lead of a 4.5 volt bias supply to the ungrounded side of C24. Connect the positive lead to chassis.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
1.	Direct	High side to an ungrounded tube shield floating over dummy converter tube. Low side to chassis.	21.6MC (unmod)	Any	DC probe thru 47KΩ to point (A). Common to chassis.	A1	Adjust for MINIMUM deflection.
2.	"	"	23.25MC	"	"	A2, A3	Attenuate generator output to maintain approximately 2.5 volts on VTVM. Adjust for maximum deflection.
3.	"	"	25.7MC	"	"	A4, A5	"

OVERALL VIDEO IF RESPONSE CHECK

If a separate marker generator is used, connect its high side to the chassis apron near the first video IF stage. Leave the low side disconnected.
If necessary, reduce the bias from 4.5 volts to 3 volts. Use only enough sweep generator output to produce usable indication on scope.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
4.	Direct	High side to an ungrounded tube shield floating over dummy converter tube. Low side to chassis.	24MC (10MC Swp)	21.6MC 22.7MC 26.1MC	Any	Vert. amp. thru 47KΩ to point (A). Low side to chassis.		Check for response similar to Fig. 1. If necessary, retouch A2 thru A5 for desired response. Adjust A4 and A5 to place 26.1MC marker on response curve. Adjust A2 and A3 to place 22.7MC marker on response curve.

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Connect two matched 100KΩ (±1%) resistors in series from point (C) to chassis. The junction of these two resistors is alignment point (E) as shown on the schematic.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
5.	.01MFD	High side to point (B). Low side to chassis.	4.5MC (unmod)	Any	DC probe thru 47KΩ to point (C). Common to chassis.	A6, A7	Adjust for maximum deflection.
6.	"	"	"	"	DC probe thru 47KΩ to point (D). Common to point (E).	A8	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60∿ modulation and 450KC sweep. Use 120∿ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
5.	.01MFD	High side to point (B). Low side to chassis.	4.5MC (450KC Swp)	4.5MC	Any	Vert. amp. thru 47KΩ to point (C). Low side to chassis.	A6, A7	Disconnect stabilizing capacitor (C4). Adjust for curve of maximum amplitude and symmetry similar to Fig. 3.
6.	"	"	"	"	"	Vert. amp. thru 47KΩ to point (D). Low side to chassis.	A8	Reconnect stabilizing capacitor (C4). Adjust so that 4.5MC occurs at center of crossover lines as in Fig. 4. SLIGHTLY retouch A7 for maximum amplitude and straightness of crossover lines.

4.5MC TRAP ALIGNMENT

Set contrast control fully clockwise.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
7.	.01MFD	High side to point (B). Low side to chassis.	4.5MC (unmod)	Any	DC probe thru detector (Fig. 2) to pin 11 (cathode) of picture tube.	A9	Adjust for MINIMUM deflection.

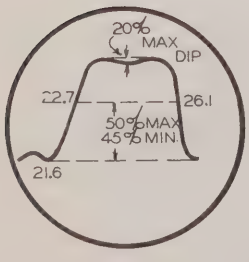

FIG. 1

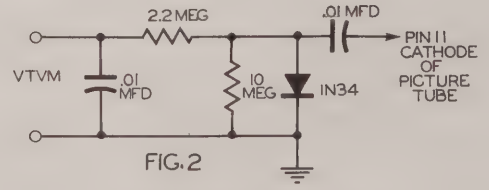

FIG. 2

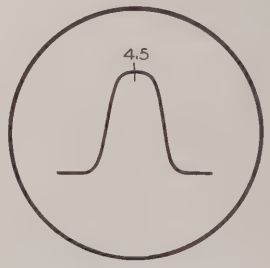

FIG. 3

ALIGNMENT INSTRUCTIONS (cont)

OSCILLATOR ALIGNMENT

Remove the dummy converter tube and replace original 6J6 in its socket. Leave bias connected as under "Video IF Alignment". Reduce bias to -3 volts. The channel oscillator adjustment screws are reached thru a hole just to the right of the channel switch shaft. The correct adjustment screw is accessible thru this hole as the channel switch is turned to each channel.
Use only enough sweep generator output to provide usable pattern on scope.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Set the fine tuning control to the mid-position of its range.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
8.	Two 120Ω carbon resistors	Across antenna terminals with 120Ω in each lead.	195MC (10MC Swp)	193. 25MC 197. 75MC	10	Vert. amp. thru 47KΩ to point (A). Low side to chassis.	A10	Adjust to place sound marker as shown in Fig. 5. Video marker should be at 50%.
			213MC (10MC Swp)	211. 25MC 215. 75MC	13		A11	
			207MC (10MC Swp)	205. 25MC 209. 75MC	12		A12	
			201MC (10MC Swp)	199. 25MC 203. 75MC	11		A13	
			189MC (10MC Swp)	187. 25MC 191. 75MC	9		A14	
			183MC (10MC Swp)	181. 25MC 185. 75MC	8		A15	
			177MC (10MC Swp)	175. 25MC 179. 75MC	7		A16	
			85MC (10MC Swp)	83. 25MC 87. 75MC	6		A17	
			79MC (10MC Swp)	77. 25MC 81. 75MC	5		A18	
			69MC (10MC Swp)	67. 25MC 71. 75MC	4		A19	
			63MC (10MC Swp)	61. 25MC 65. 75MC	3		A20	
			57MC (10MC Swp)	55. 25MC 59. 75MC	2		A21	

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RF AND MIXER ALIGNMENT

Leave bias connected as under "Video IF Alignment". Reduce bias to -3 volts. Use only enough sweep generator output to provide usable pattern on scope.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
9.	Two 120Ω carbon resistors	Across antenna terminals with 120Ω in each lead.	195MC (10MC Swp)	193. 25MC 197. 75MC	10	Vert. amp. thru 47KΩ to point (F). Low side to chassis.	A22, A23, A24	Adjust for response similar to Fig. 6.
10.	"	"	213MC (10MC Swp)	211. 25MC 215. 75MC	13	"		Check for response similar to Fig. 6. If markers fall below 70% on any channel, make slight compromise adjustments of A22, A23 and A24 with channel switch set to that channel, then recheck all other channels to see that they have not been seriously affected.
			207MC (10MC Swp)	205. 25MC 209. 75MC	12			
			201MC (10MC Swp)	199. 25MC 203. 75MC	11			
			189MC (10MC Swp)	187. 25MC 191. 75MC	9			
			183MC (10MC Swp)	181. 25MC 185. 75MC	8			
			177MC (10MC Swp)	175. 25MC 179. 75MC	7			
			85MC (10MC Swp)	83. 25MC 87. 75MC	6			
			79MC (10MC Swp)	77. 25MC 81. 75MC	5			
			69MC (10MC Swp)	67. 25MC 71. 75MC	4			
			63MC (10MC Swp)	61. 25MC 65. 75MC	3			
			57MC (10MC Swp)	55. 25MC 59. 75MC	2			

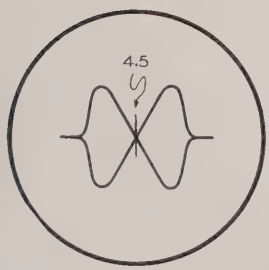


FIG.4

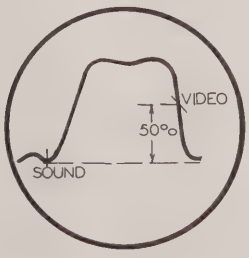


FIG.5

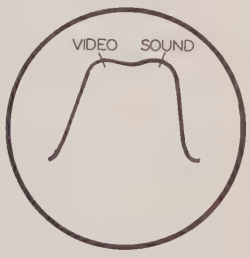
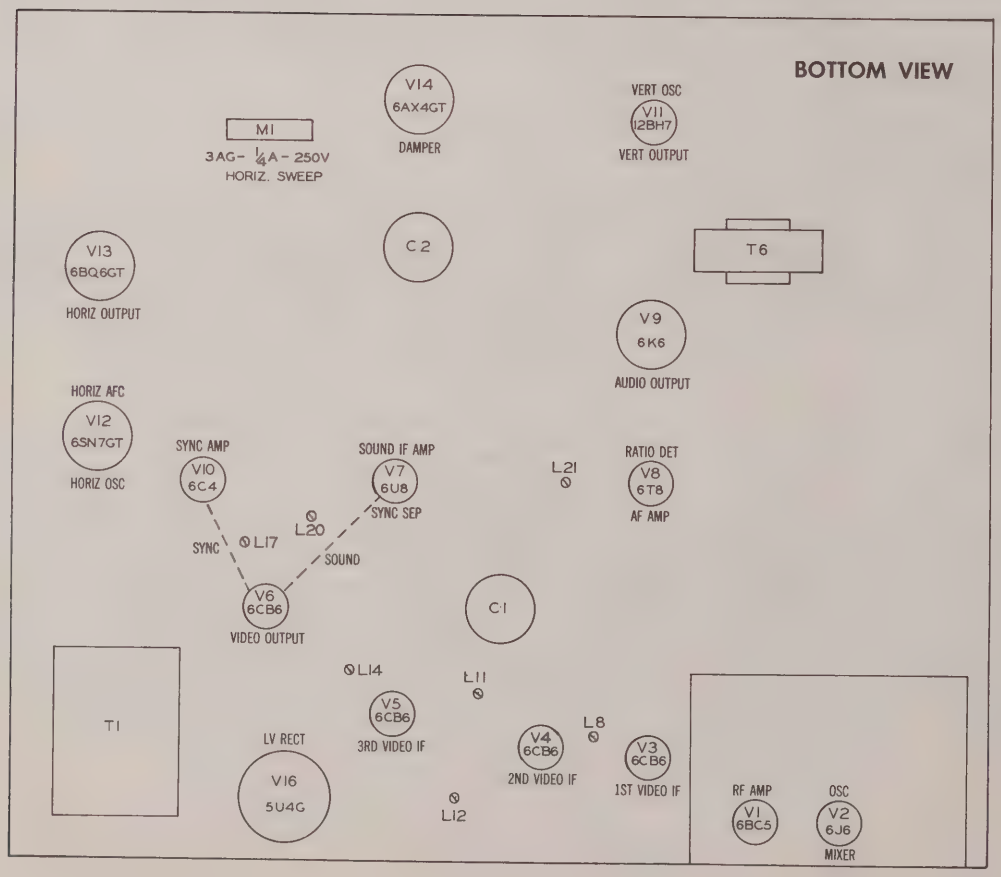


FIG.6

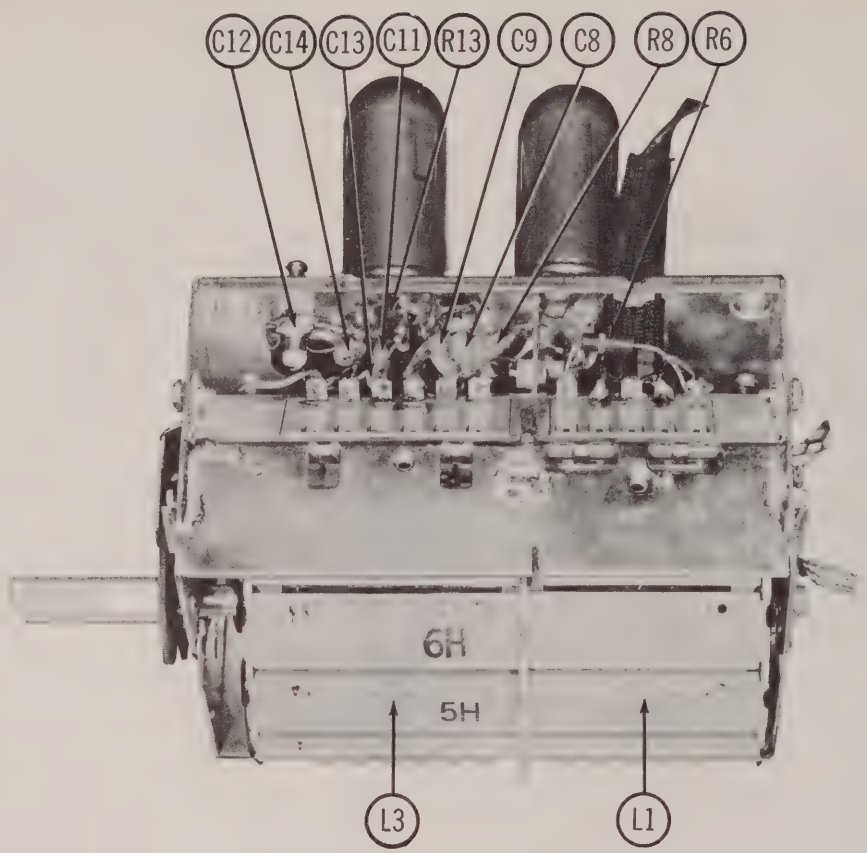
RESISTANCE MEASUREMENTS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6BC5	1Meg	0Ω	.1Ω	0Ω	†3.2KΩ	†5.4KΩ	0Ω		
V 2	6J6	†17KΩ	†17KΩ	.1Ω	0Ω	225KΩ	10KΩ	0Ω		
V 3	6CB6	1Meg	47Ω	.1Ω	0Ω	†2KΩ	†2KΩ	0Ω		
V 4	6CB6	1Meg	47Ω	.1Ω	0Ω	†1.9KΩ	†1.9KΩ	0Ω		
V 5	6CB6	.3Ω	120Ω	.1Ω	0Ω	†1.8KΩ	†12KΩ	0Ω		
V 6	6CB6	1Meg	300Ω	0Ω	.1Ω	†6.8KΩ	†33KΩ	300Ω		
V 7	6U8	†25KΩ	470KΩ	†5KΩ	.1Ω	0Ω	†5KΩ	0Ω	0Ω	2.2Meg
V 8	6T8	INF	47KΩ	INF	.1Ω	0Ω	0Ω	0Ω	10Meg	†220KΩ
V 9	6K6GT	NC	.1Ω	†900Ω	†525Ω	470KΩ	NC	0Ω	680Ω	
V 10	6C4	†15KΩ	NC	.1Ω	0Ω	†15KΩ	200KΩ	0Ω		
V 11	12BH7	▲3.5Meg	1.8Meg	0Ω	.1Ω	.1Ω	▲6KΩ	2.2Meg	1KΩ	0Ω
V 12	6SN7GT	400KΩ	†47KΩ	0Ω	1.4Meg	†40KΩ	400KΩ	.1Ω	0Ω	
V 13	6BQ6GT	NC	0Ω	NC	†6.8KΩ	470KΩ	TP	.1Ω	100Ω	Top Cap ▲54Ω
V 14	6AX4GT	NC	NC	350KΩ	NC	†65Ω	NC	.1Ω	0Ω	
V 15	1B3GT		PINS	1 - 8	HAVE	INFINITE	RESISTANCE			Top Cap ▲510Ω
V 16	5U4G	NC	20KΩ	NC	25Ω	NC	23Ω	NC	20KΩ	
V 17	21YP4	0Ω	0Ω	Pin 6 †1.8KΩ	Pin 10 ▲4.7KΩ	Pin 11 †300KΩ	Pin 12 .1Ω			

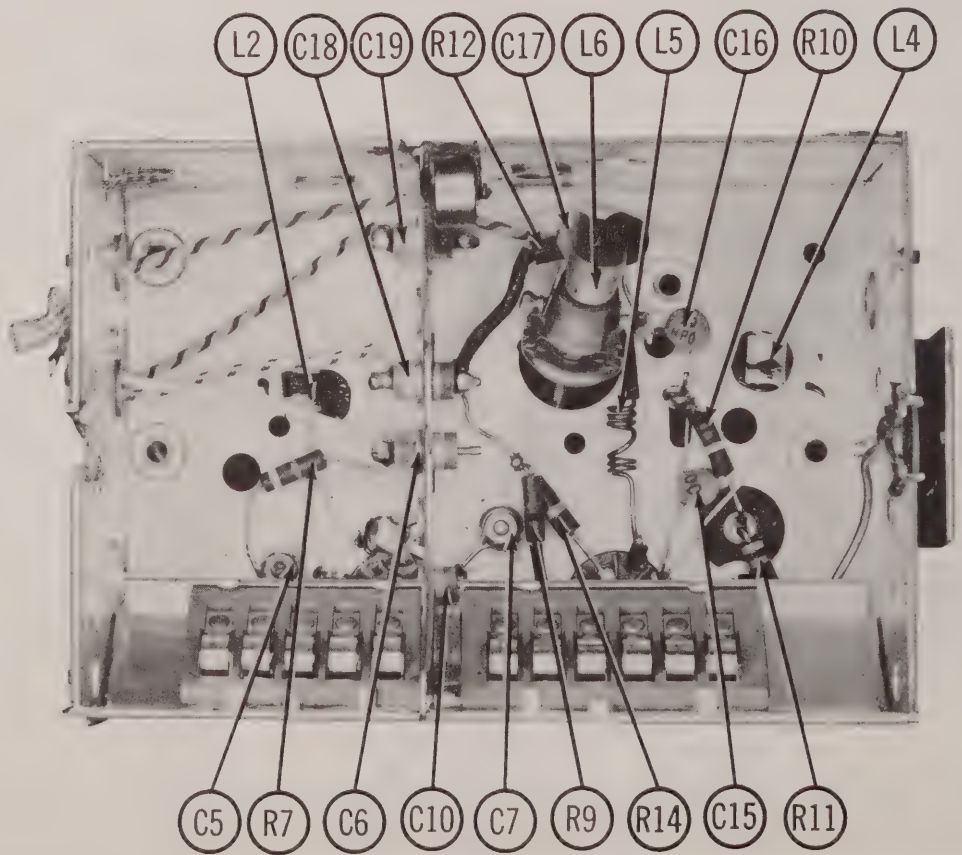
† MEASURED FROM PIN 8 OF V16.
NC - NO CONNECTION
TP - TIE POINT



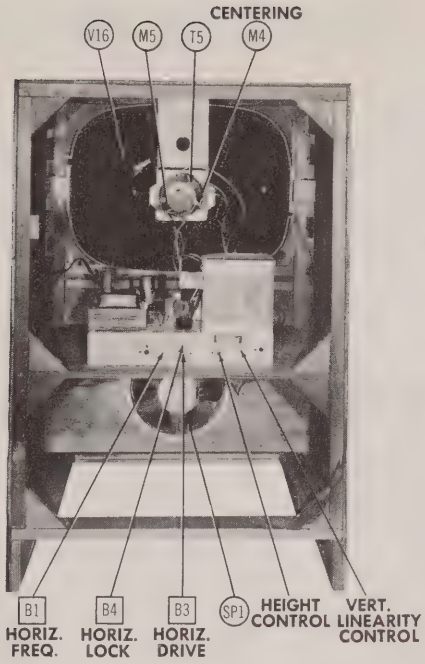
TUBE PLACEMENT CHART



RF TUNER-RIGHT SIDE



RF TUNER-BOTTOM VIEW



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DENVER, COLORADO

CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Pre-set horizontal lock trimmer (B4) one turn counter clockwise from tight and the horizontal drive trimmer (B3) two turns counter clockwise from tight.

Turn the set on and tune in a TV station, preferably a test pattern.

(A) HORIZONTAL FREQUENCY ADJUSTMENT

1. Rotate the horizontal hold control over its entire range. If picture does not remain in sync over most of its range, adjust the horizontal frequency slug (B1) for best sync.

2. If unable to adjust B1 for proper horizontal hold range, adjust the horizontal waveform slug (B2) counter clockwise a few turns and repeat step 1. Picture should remain in horizontal sync, if not, continue with "Horizontal Waveform Adjustment".

(B) HORIZONTAL WAVEFORM ADJUSTMENT

1. Short together terminals "C" and "D" of the horizontal oscillator coil (L22).

2. Set the horizontal hold to its maximum counter clockwise position.

3. Adjust B1 until picture just locks in horizontally.

4. Remove short from terminals "C" and "D" of L22. If picture loses sync with short removed, adjust B2 clockwise until picture falls into sync.

5. Connect the vertical input lead of an oscilloscope to terminal "C" of L22. Adjust the waveform slug (B2) until broad and narrow peaks are of equal amplitude as shown in Fig. 7. While adjusting B2 keep the picture in sync by turning the horizontal hold control clockwise. Disconnect scope from receiver.

6. Set the horizontal hold control fully clockwise and adjust B1 until picture remains in sync while switching off channel and back. With the horizontal hold control at mid-position the picture should fall in sync when switching off channel and back again.

(C) HORIZONTAL LOCK ADJUSTMENT

1. Set the horizontal hold control fully clockwise, switch off channel and back again. Picture should remain in sync.

2. If not, SLIGHTLY adjust B1 clockwise until picture falls out of sync with diagonal lines sloping to the left.

3. Turn the horizontal hold control counter clockwise, if more than three bars are present just before picture falls in sync adjust the horizontal lock trimmer (B4) clockwise. If less than two bars are present, adjust B4 counter clockwise. Picture should now remain in sync while rotating the horizontal hold control over its full range and switching off channel and back again.

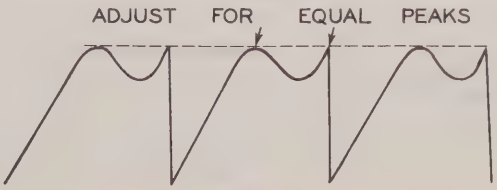


FIG. 7

TROUBLE SHOOTING AIDS

SWEEP

HORIZONTAL

LOSS OF SWEEP

Follow procedure outlined under "Loss Of High Voltage".

INSUFFICIENT SWEEP

Check by substitution V13, V14 and V16. Check adjustment B3. Check T3, T5A, C70, R74, R75 and other associated components.

DRIVE LINES

Check by substitution V13 and V14. Check adjustment B3. Check R71, R74, R75, C70 and other associated components.

COMPRESSED LEFT SIDE

Check by substitution V13 and V14. Check horizontal output and damper stages for component failure or change of value.

FOLDS

Follow procedure outlined under "Drive Lines".

PIE CRUST EFFECT

Check by substitution V12, V13 and V14. Check C63, C64, for open. Check L22, R70, C67, C68, C66 and other associated components.

XMAS TREE EFFECT

Check by substitution V12, V13 and V14. Check T3 and T5 for internal arcing. Check L22, C62, C67, C68, C70, R67, R66, R70 and other associated components.

VERTICAL

LOSS OF SWEEP

Substitute V11. Check waveform W7.

If Satisfactory	If Unsatisfactory
Check T4, T5B, R57, C2B, C2C and other associated components.	Check T2, C57, C59, R5, R54, R53 and other associated components.

INSUFFICIENT SWEEP

Substitute V11. Check height and vertical linearity controls for proper operation. Check R54, T4 and other associated components.

COMPRESSED AT BOTTOM

Substitute V11. Check R5, R54, R57, T2, C59 and other associated components.

COMPRESSED AT TOP

Substitute V11. Check R4, C59, C2C, T4 and other associated components.

FOLDS

Substitute V11. Check C58, C59, T4, T5B, R55, R57 and other associated components.

SYNC

LOSS OF VERTICAL AND HORIZONTAL SYNC

Check by substitution V7 and V10. Check C54, C55, R46, R47, R50 and other associated components.

LOSS OF VERTICAL SYNC-HORIZONTAL SYNC SATISFACTORY

Substitute V11. Check vertical integrator network. Check R1A, R53, C57, T2 and other associated components.

LOSS OF HORIZONTAL SYNC-VERTICAL SYNC SATISFACTORY

Substitute V12. Check R67, R62, C60, C66, C64, L22 and other associated components.

HORIZONTAL BENDING

Check by substitution V7, V10 and V12. Check components associated with V12.

VIDEO

LOSS OF VIDEO

Substitute V6. Check C40, C42, C43, R32, R33, R31, L19 and other associated components.

SOUND BARS(4.5MC BEAT)

Adjust tuner fine tuning for best sound and picture. Check adjustment A9. Check video IF alignment.

POOR CONTRAST

Substitute V6. Check contrast control. Check L15, L18, R31, C40, C43 and other associated components.

NEGATIVE PICTURE

Substitute V6. Check picture tube. Check C40, C43 and L15. Check video crystal detector network and other associated components.

SMEAR

Substitute V6. Check L15, L16, L18, C40, C43 and other associated components.

WIDE BLACK BAR ACROSS PICTURE

Check by substitution V1, V3, V4, V5 and V6 for heater to cathode leakage.

AUDIO

WEAK OR NO SOUND

Check by substitution V7, V8, and V9. Check stages V8 and V9 using video signal generator. Apply audio signal across R3B.

If Satisfactory	If Unsatisfactory
Check ratio detector and audio IF stages for component failure or change of value.	Check C50, C51, C52, C53, C3, C2D, R44, R43, R41, T6 speaker and other associated components.

BUZZ

Adjust tuner fine tuning for best sound and picture. Check adjustment A8 for minimum buzz. If still unsatisfactory, check audio IF alignment.

DISTORTED

Follow procedure outlined under "Weak Or No Sound".

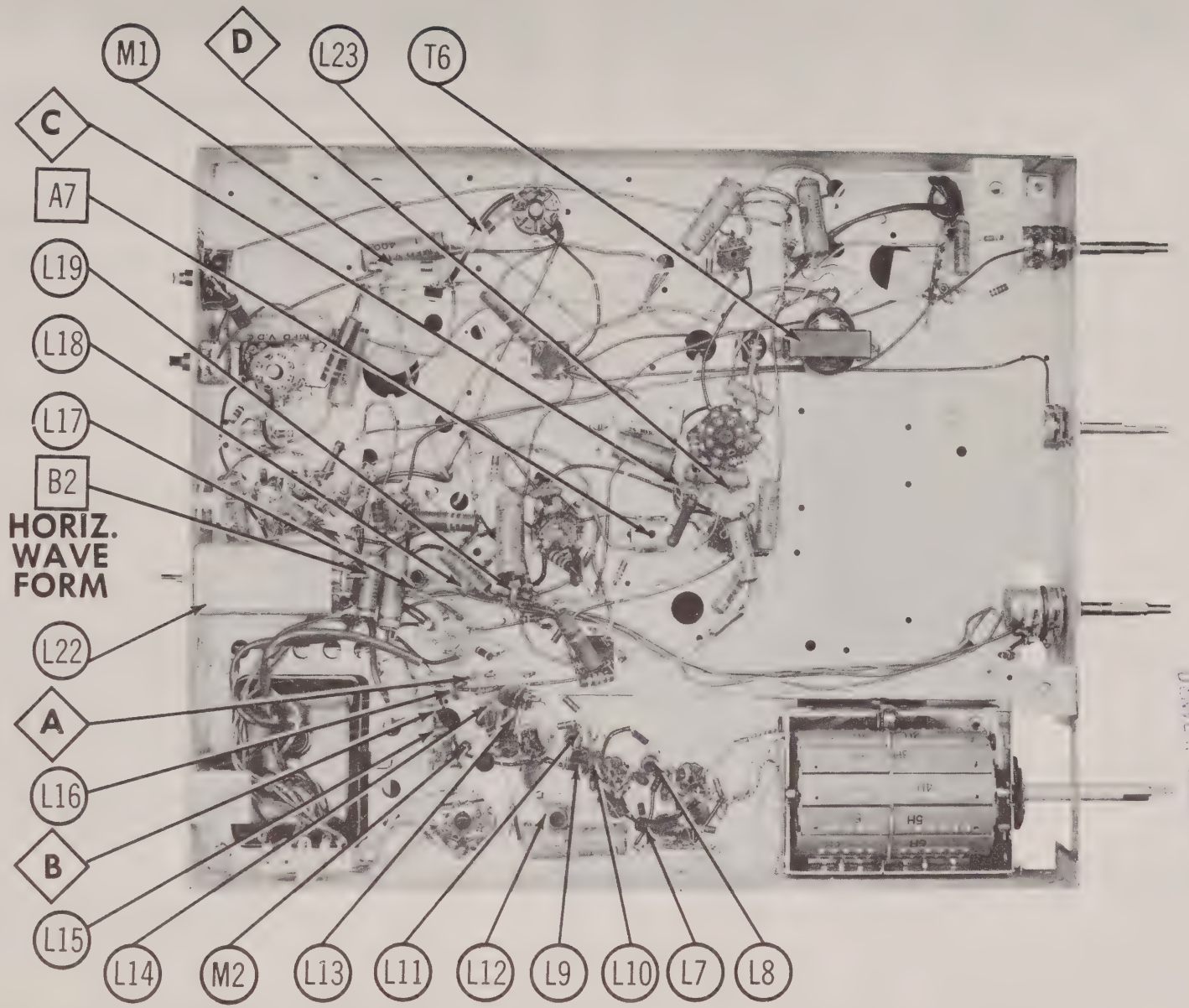
POWER

DEAD SET

If filaments fail to light, check AC interlock assembly. Check switch on volume control and T1. If filaments light, substitute V16. Check B+ filter and decoupling network.

SMALL AND/OR DIM PICTURE

Substitute V16. Check B+ filter and decoupling network.



PROPERTY OF
L. F. BLAHNIK-BISHOP
DENVER, COLORADO

CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENTIFICATION

FADA MODELS 17KD, 17L1, 17L2, EB, LO, 21KA, 21K1,
LO, 21L1, 21L2, EB, LO, 21L3, BM, 2111O, V2211BM

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No	USE	REPLACEMENT DATA: FADA PART No.	STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	RF Amplifier	6BC5	6BC5	7BD	
V2	Osc.-Mixer	6J6	6J6	7BF	
V3	1st. Video IF Amp.	6CB6	6CB6	7CM	
V4	2nd. Video IF Amp.	6CB6	6CB6	7CM	
V5	3rd. Video IF Amp.	6CB6	6CB6	7CM	Chassis not stamped "E" uses pentode Sec. of 6AN8
V6	Video Output	6CB6	6CB6	7CM	
V7	Sound IF Amp.-Sync Separator	6U8	6U8	9AE	
V8	Ratio Det. - AF Amp.	6T8	6T8	9E	
V9	Audio Output	6K6GT	6K6GT	7S	6AR5 used in some 21" table models
V10	Sync Amp	6C4	6C4	8BG	Chassis not stamped "E" uses triode Sec. of 6AN8
V11	Vert. Osc. - Vert. Output	12BH7	12BH7	9A	
V12	Horiz. AFC-Horiz. Osc.	6SN7GT	6SN7GT	8BD	
V13	Horiz. Output	6BQ6GT	6BQ6GT	8AM	
V14	Damper	6AX4GT	6AX4GT	4CG	
V15	HV Rectifier	1B3GT	1B3GT	3C	
V16	LV Rectifier	5U4G	5U4G	5T	

CATHODE-RAY TUBE

ITEM No.	REPLACEMENT DATA: FADA PART No	CBS-HYTRON PART No.	GENERAL ELECTRIC PART No.	SYLVANIA PART No.	WESTINGHOUSE PART No	RETMA BASE TYPE	NOTES
V18	21TP4	21TP4	21TP4	21TP4 ①	21TP4 ①	12L	① Aluminized
		21TP4A ②	21TP4A ②	21TP4A ①	21TP4A ①	12L	
	17HP4 / 17RP4	17HP4 / 17RP4	17HP4 / 17HP4	17HP4 / 17RP4	17HP4 / 17RP4	12L	
				17HP4A ②			

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	VOLT	REPLACEMENT DATA: FADA PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	PYRAMID PART No	SANGAMO PART No	NOTES
C1A	±50	450	22.101			FP266	TM-3127	T-180	
B	±80	350				TC62			
C	⊕10	350							
C2A	±40	350	22.102			FP431.7	TM-4026	Q-415	
B	±40	450							
C	100	50							
D	⊕10	450							
C3	25	80	22.86			TC36	TD-25-50	FM-0525	
C4	1	150	22.70				TD-4-150	MMT-4501	
C5	3-9			829-10					
C6	800								
C7	5-3			829-3	311S-01-QR5	CT565A			
C8	1000			DD-102	801-001	DC-521			
C9	220			D6-231	811-231	UC-5323			
C10	800								
C11	120			D6-121	811-121	UC-5312			
C12	5-3			829-3	311S-01-QR5	CT565A			
C13	10			TC2-10	NP0K-100	ET-541			
C14	5			D6-121	811-121	UC-5312			
C15	1000			DD-102	801-001	DC-521			
C16	10			TC2-10	NP0K-100	ET-541			
C17	120			D6-121	811-121	UC-5312			
C18	800								
C19	800								
C20	5000		17.44	DD-502	811-005	DC-525		C-1250	
C21	1500		17.45	D6-152	GP2L-152	UC-5215		C-1215	
C22	3000		17.44	DD-502	811-005	DC-525		C-1250	
C23	120		17.108	D6-121	GP2L-121	UC-5312		K-1312	
C24	5000		17.44	DD-502	811-005	DC-525		C-1250	
C25	.23	200	18.81			FP6022	IMP2-P32	3303022	Note 1
C26	5000		17.44	DD-502	811-005	DC-525		C-1250	
C27	5000		17.44	DD-502	811-005	DC-525		C-1250	
C28	120		17.108	D6-121	GP2K-121	UC-5312		K-1312	
C29	2		17.127	TC2-2R2	NP0A-2R2	ZT-5522			
C30	47		17.130	TC2-47	NP0K-470	ET-5447		KH-1447	
C31	5000		17.44	DD-502	811-005	DC-525		C-1250	
C32	5000		17.44	DD-502	811-005	DC-525		C-1250	
C33	5000		17.44	DD-502	811-005	DC-525		C-1250	
C34	5000		17.44	DD-502	811-005	DC-525		C-1250	
C35	120		17.108	D6-121	GP2K-121	UC-5312		K-1312	Note 2
C36	3			TC2-3R3	NP0A-3R3	ZT-5533			Note 2
C37	4.7		17.154						Note 2
C38	10		17.71	TC2-10	NP0K-100	ET-541		KH-1410	Note 2
C39	10		17.71	TC2-10	NP0K-100	ET-541		KH-1410	
C40	.1	200	18.49	DF-104		FP401	IMP2-P1	330401	
C41	120		17.108	D6-121	GP2K-121	UC-5312		K-1312	Note 2
C42	47		17.130	TC2-47	NP0K-470	ET-5447		KH-1447	
C43	.1	400	17.75	DF-104		FP401	IMP4-P1	330401	
C44	6.8		17.66	TC2-6R8	NP0A-6R8	ZT-5568			
C45	6.8		17.66	TC2-6R8	NP0A-6R8	ZT-5568			
C46	1000		17.45	D6-153	GP2L-153	UC-5315		C-1315	Note 2
C47	2		17.127	TC2-2R2	NP0A-2R2	ZT-5522			
C48	620		17.125						
C49	.0039	400	18.71	D6-392	GP3-333-392	PT6234	IMP5-D4	3306234	
C50	.01	400	18.72	D6-103	GP3-333-103	PT411	IMP4-61	330411	
C51	.0047	800	18.68	D6-472	GP3-333-472	PT6247	IMP5-D47	3306247	
C52	.022	800	18.82	DF-203	817-02	PT6122	IMP6-S22	3306122	
C53	.0047	800	18.68	D6-472	GP3-333-472	PT6247	IMP6-D47	3306247	
C54	10000		17.80	DD-103	811-01	DC-511	IMP6-01	330611	
C55	.01	400	18.72	D6-103	GP3-333-103	PT411	IMP4-61	330411	
C56A	2000	} ea87.1	4PC-106	ea605-01		PT625	IMP6-D5	C-1250	
B	5000					PT625	IMP6-D5	C-1250	
C	5000					PT625	IMP6-D5	C-1250	

PARTS LIST AND DESCRIPTIONS

CAPACITORS (cont)

ITEM No	RATING: CAP	VOLT	REPLACEMENT DATA: FADA PART No	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No	NOTES
C57	.0047	400	18.68	D6-472	GP3-333-472	PT6247	IMP6-D47	3306247	
C58	.047	400	18.67	DF-503		PT4147	IMP4-D47	3304147	
C59	.1	400	18.75	DF-104		PT401	IMP4-P1	330401	
C60	.82		17.149	TC2-821	NP0L-820			K-1492	
C61	1000		17.153	D6-123	GP2L-103	UC-521		K-1310	
C62	68		17.152	TC2-680	N750K-680	MT-5468		MT-1468	
C63	.1	200	18.49	DF-104		PT401	IMP2-P1	330201	
C64	.022	600	18.82	DF-303	617-03	PT6123	IMP6-S23	3306123	
C65	.47	200	18.92	DF-503		PT4047	IMP2-P47	3302047	
C66	.047	400	18.67	DF-503		PT4147	IMP4-D47	3304147	
C67	.330	500	17.59					KH-1333	
C68	.01	400	18.72	D6-103	GP3-333-103	PT411	IMP4-61	330411	
C69	1000	500	17.41			MCB355		KH-1210	
C70	680	500	17.39					KH-1368	
C71	.1	400	18.75	DF-104		PT401	IMP4-P1	330401	
C72	.22	200	18.91			PT4022	IMP2-P22	3302022	
C73	.1	400	12.75	DF-104		PT401	IMP4-P1	330401	
C74	50	2000	17.161	DD50-506					
C75	10		17.71	TC2-10	NP0K-100	ET-541		KH-1410	

Note 1. Some versions use .1MFD in this application (part #12.49).
Note 2. Not used in some versions.
* Items C56A, C56B, C56C, R52A, R53B, R53C are combined in one unit.

CONTROLS

ITEM No.	RATING: RESIST-ANCE	WATTS	REPLACEMENT DATA: FADA PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No	INSTALLATION NOTES
R1A	1Meg	½	53.98	*QJ-168	RTV-130	SBB-510	UF16L	Vert. Hold - Panel
B	50KΩ	½					UR54L	Horiz. Hold - Rear
R2A	1Meg	½	52.78	QU-137	A47-1Meg-S	B-69	U-54	Brightness
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R2A
R3A	150KΩ	½	52.79	*QJ-735		F1-7	UF152L	Contrast - Panel
B	500KΩ	½				R2-41	UR55A	Volume - Rear
C	Switch					KB-1	UB-28	Attach to R3B
R4A	500Ω	2	52.68	WK-5000	A43-500Ω	BR-135	BS600L	Vert. Linearity
B	Shaft		Not Req.	Not Req.	FK8-1/4	Not Req.	Not Req.	Attach to R4A
R5A	2.5Meg	½	53.24	QU-239	A47-2.5Meg-S	AB-63	EU-565	Height
B	Shaft		Not Req.	Not Req.	FK8-1/4	AE-1	Not Req.	Attach to R5A

* CONCENTRIKIT EQUIVALENT: KIT K-4, BASE ELEMENTS & SHAFTS: D17-109 & P6-125 (PANEL)
B11-133 & R1-209 (REAR)
76-1 SWITCH

* CONCENTRIKIT EQUIVALENT: KIT K-2, BASE ELEMENTS & SHAFTS: B11-137 & P1-126 (PANEL)
B11-123 & R2-212 (REAR)

† Universal replacement (Mallory exact duplicate part no. UE161)

RESISTORS

ITEM No.	RATING: OHMS	WATT	REPLACEMENT DATA: FADA PART No.	IRC PART No.	NOTES
R6	15KΩ	1		BTS-15K	
R7	47KΩ	1		BTS-47K	
R8	2200Ω	1		BTS-2200	
R9	1000Ω	1		BTS-1000	
R10	220KΩ	1		BTS-220K	
R11	470Ω	1		BTS-470	
R12	15KΩ	1		BTS-15K	
R13	10KΩ	1		BTS-10K	
R14	15KΩ	1		BTS-15K	
R15	100Ω	1	32.169	BTS-100	
R16	330Ω	1	32.173	BTS-330	
R17	330Ω	1	32.173	BTS-330	
R18	8200Ω	1	32.77	BTS-8200	
R19	47Ω	2	32.197	BTS-47	
R20	100Ω	1	32.169	BTS-100	
R21	10KΩ	1	32.11	BTS-10K	
R22	47Ω	2	32.197	BTS-47	
R23	100Ω	1	32.169	BTS-100	
R24	5600Ω	1	32.128	BTS-5600	
R25	120Ω	1	32.118	BTS-120	
R26	10KΩ	1	32.11	BTS-10K	
R27	100Ω	1	32.169	BTS-100	
R28	1Meg	1	32.33	BTS-1Meg	
R29	5600Ω 5%	1	32.126	BTS-5600 5%	
R30	1Meg	1	32.33	BTS-1Meg	
R31	47Ω	2	32.197	BTS-47	
R32	33KΩ	1	32.409	BTA-33K	
R33	5600Ω	2	32.631	BTB-5600	
R34	15KΩ	1	32.13	BTS-15K	Note 1
R35	100KΩ	1	32.89	BTS-100K	
R36	470KΩ	1	32.92	BTS-470K	
R37	3300Ω	1	32.178	BTS-3300	
R38	15KΩ	1	32.13	BTS-15K	
R39	47KΩ	1	32.15	BTS-47K	
R40	10Meg	1	32.39	BTS-10Meg	
R41	330KΩ	1	32.18	BTS-330K	
R42	470KΩ	1	32.95	BTS-470K	
R43	680Ω	1	32.115	BTA-680	

ITEM No.	RATING: OHMS	WATT	REPLACEMENT DATA: FADA PART No.	IRC PART No.	NOTES
R44	470Ω	1	32.360	BTA-470	
R45	2.2Meg	½	32.34	BTS-2.2Meg	
R46	47KΩ	1	32.156	BTA-47K	
R47	18KΩ	1	32.82	BTA-18K	
R48	1Meg	½	32.33	BTS-1Meg	
R49	220KΩ	½	32.18	BTS-220K	
R50	18KΩ	2	32.887	BTB-18K	
R51	22KΩ	1	32.83	BTA-22K	Note 5
R52A	22KΩ	½		BTS-22K	
B	8200Ω	½	4067.1	BTS-8200	
C	8200Ω	½		BTS-8200	
R53	1.8Meg	½		BTS-1.8Meg	Note 2
R54	2.2Meg	½	32.34	BTS-2.2Meg	Note 2
R55	10KΩ	½		BTS-10K	Note 4
R56	2.2Meg	½	32.34	BTS-2.2Meg	
R57	4700Ω	2	32.249	BTB-4700	
R58	560Ω	1	32.68	BTS-560	
R59	560Ω	1	32.68	BTS-560	
R60	330KΩ	½	32.205	BTS-330K	
R61	820KΩ 5%	½	32.23	BTS-820K 5%	
R62	330KΩ	½	32.205	BTS-330K	
R63	82KΩ	½	32.144	BTS-82K	
R64	3900Ω	½	32.202	BTS-3900	
R65	150KΩ	½	32.90	BTS-150K	
R66	27KΩ	½	32.85	BTS-27K	
R67	68KΩ	½	32.16	BTS-68K	
R68	1.8Meg	½	32.208	BTS-1.8Meg	
R69	150KΩ	½	32.90	BTS-150K	
R70	18KΩ	½	32.82	BTS-18K	
R71	47KΩ	½	32.15	BTS-47K	
R72	470KΩ	½	32.92	BTS-470K	
R73	47Ω	½	32.197	BTS-47	
R74	10KΩ	2	32.625		
R75	680KΩ	2	32.681	BTB-6800	
R76	33Ω	2	32.43	BTS-33	
R77	10KΩ	½	32.11	BTS-10K	
R78	3.3Ω	½	32.62		
R79	175Ω	30	117.98	3D-1750	
R80	10KΩ	½		BTS-10K	Note 6

* Items R52A, R52B, R52C, C56A, C56B and C56C are combined in one unit.
Note 1: Some versions use a 22KΩ resistor (part #32.13)in this application.
Note 2: Some versions use a 1.5Meg resistor in this application.
Note 3: Some versions use a 1.8Meg or 2.7Meg resistor in this application.
Note 4: Some versions use a 330Ω resistor in this application.
Note 5: Some versions use a 470Ω resistor in this application.
Note 6: Not used in some versions.

TRANSFORMER (POWER)

ITEM No.	RATING: PRI.	SEC. 1	SEC. 2	REPLACEMENT DATA: FADA PART No	Halldorson PART No.	Merit PART No	RCA TYPE No	Stancor PART No	Thordarson PART No.	Triad PART No
T1	117VAC ① ② 32A	526VCT .220A	5VAC ③ 3A	42.90	P9739 ④			P-8333 ⑤ ②		R-61BC ⑤ ③
	SEC 3	SEC 4	SEC 5							
	6.3VAC ③ ⑦ 4A									

① Drill new mounting holes.
② Tape 6.3V ③ 1.2A, parallel and phase 6.3V ③ 7.1A and .8A for Sec. #3.
③ Tape 6.3V ④ 1.2A, parallel and phase 6.3V ④ 6A for Sec. #3.
④ Tape 6.3V ⑦ 4A winding.

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No.	USE	REPLACEMENT DATA: FADA PART No	Halldorson PART No.	Merit PART No.	RCA TYPE No	Ram PART No	Stancor PART No	Thordarson PART No.	Triad PART No
T2	Vert. Osc. Trans.	43.89	P8700	A-8900	30P31	V40S ①	A-8211	24A8T	A-85Z
T3	Horiz. Output Trans.	43.92	P8614 *	HVO-21 * ②	32S31 * ①	X066 *	A-8230 * ②	F1J-27 *	D-44 *
T4	Vert. Output Trans.	42.93	Z1804	A-3037	22Z71	V31S	A-8123	26S52	A-102X
T5A	Yoke Horiz.(344MT)	37.286	DP605 ②	MDF-73 ②	22ZD1 ③	Y70F25 ② ③	DY-15A ①	Y-10 ①	Y-19-1 ①
B	Vert.(444MT)								

① Drill new mounting hole(s).
② Connect horizontal damping network across terminals #1 and #2, use original network, if necessary.
③ See instructions packed with unit pertaining to yoke damping network.
④ Remove damping capacitor from terminals #3 and #7, use original horizontal damping network if necessary.
⑤ Use original mounting bracket.

*HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA

Use Original Width Coil Unless Replacement Type is Listed

	ORIGINAL TERMINAL CONNECTIONS	Halldorson Replacement Connections	Merit Replacement Connections	RCA Replacement Connections	Ram Replacement Connections	Stancor Replacement Connections	Thordarson Replacement Connections	Triad Replacement Connections
	8	8	2	8	8	2	2	8
	7	8	2	7	8	2	2	7
	6	7	6 See Note ⑥	7	6	6	6	6
	5 (NC)	NC	NC	NC	NC	NC	NC	NC
	1	5	1	1	5	1	1	1
Spiral Rein	→	7	7	6	7	7	7	7

⑤ If excessive yoke "ringing" occurs, connect a 1000Ω, ½ watt resistor in series with C74 across yoke terminals #1 and #2.
⑦ Remove resistor (R76) from circuit.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE: PRI.	SEC.	REPLACEMENT DATA: FADA PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T6	4.5KΩ	3.2Ω	42.57	Z1407	A-3930	A-3977	24S51	S-3X	

SPEAKER

ITEM No.	RATINGS: SIZE	FIELD	V C IMP	REPLACEMENT DATA: FADA PART No.	QUAM PART No.	NOTES
SP1	10	PM	3 3Ω	107 58 107 47 ① 107 60 ②	10A31	① Alternate 10" PM speaker ② Speaker used in models 17L1, 17L2, 17L2LO, 17L2EB, 21L1, 21L2, 21L2LO, and 21L2EB

COILS (RF-IF)

ITEM No.	USE	DC RES.: PRI	SEC	REPLACEMENT DATA: FADA PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No	NOTES
L1	Ant. Coil	0Ω CT	0Ω					
L2	Fil. Choke	0Ω		37.89	19-3001	TV-189	6174	.6 Microhenry
L3	RF, Mixer Grid & Osc. Coil	0Ω		37.89	17-1003	TV-102	6188 *	
L4	Fil. Choke	0Ω		37.89	19-3001	TV-189	6174	.6 Microhenry
L5	RF Coil	0Ω					6612	13 Microhenries
L6	2nd. Video IF	.2Ω		37.89	17-1004	TV-102	6189 *	
L7	Fil. Choke	0Ω		37.89	19-3001	TV-189	6174	.6 Microhenry
L8	1st. Video IF	.2Ω					6613	13 Microhenries, Note 1
L9	RF Choke	1.6Ω		37.187	19-1005		6613	not used in all versions
L10	RF Choke	1.6Ω						Not used in all versions- Note 1
L11	3rd. Video IF	.3Ω		37.89	17-1004	TV-102	6189 *	
L12	Sound Trap	0Ω		37.288	19-1031	TV-150	6171	
L13	RF Choke	1.6Ω		37.187	19-1005		6613	
L14	4th. Video IF	.2Ω		37.89	17-1003	TV-102	6188 *	

FADA MODELS 17KD, 17L1, 17L2, EB, LO, 21KA, 21K1, LO, 21L1, 21L2, EB, LO, 21L3, BM, 21T10, V22 1TBM

PARTS LIST AND DESCRIPTIONS (Continued)

COILS (cont)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: FADA PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L15	Series Peaking Coil	7Ω		37.289	19-3125 ■		6153 ■	120 Microhenries, wound on 10KΩ resistor
L16	Shunt Peaking Coil	16Ω		37.235	19-3660	TV-188	4650	600 Microhenries
L17	4.5MC Trap	1.8Ω		37.226	20-1004	TV-151	1469	
L18	Series Peaking Coil	11Ω		37.290	19-3250 ▲	TV-185 ▲	6181 ▲	245 Microhenries, wound on 18KΩ resistor
L19	Shunt Peaking Coil	7Ω		37.237	19-3250	TV-185	6181	245 Microhenries
L20	Sound IF	7.5Ω		37.285	17-3495 ♦	TV-113 ♦	1470A	
L21	Ratio Det.	5.3Ω	1.8ΩCT	37.253	17-3497	TV-115	6205	Tertiary winding -.7Ω
L22	Horiz. Osc.	21Ω	55Ω	37.219	20-1402 †	TV-162 †	6183 †	Waveform winding -44Ω
L23	RF Choke	8.2Ω		37.288	19-1005		4612	10 Microhenries, IRC part #CL-1

Note 1: Bifilar wound coil part #37.294 used in some versions.
* Enlarge mounting hole.
■ Parallel with 10KΩ resistor.
▲ Parallel with 18KΩ resistor.
♦ Use one winding only.
† Reverse coil mounting in can.

FILTER CHOKE

ITEM No.	RATINGS: TOTAL DIRECT CURRENT	RATINGS: D. C. RESISTANCE	RATINGS: INDUCTANCE (0 CURRENT 1000 ∿)	REPLACEMENT DATA: FADA PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
L24	.160ADC	58Ω	1.92 Hy	42.91	C5030	C-2974 ①	C-2325	26C43 ①	C-21X ①

① File mounting hole if necessary.

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA: FADA PART No. FUSE	FADA PART No. HOLDER	LITTELFUSE PART No. FUSE	LITTELFUSE PART No. HOLDER	BUSS PART No. FUSE	BUSS PART No. HOLDER
M1	3AG	1/4A 250V	122.32		318.250 (3AG-1/4A)		GJV 1/4A	

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA: FADA PART No.	SYLVANIA PART No.		NOTES
M2	1N64		1N60 or 1N132		Video Detector

MISCELLANEOUS

ITEM No.	PART NAME	FADA PART No.	NOTES
M3	Tuner	42.94	VHF
M4	Centering Magnet	112.37	
M5	Ion Trap	112.39	
B4	Trimmer Cap.	132.14	Horiz. Lock (10-160MMF)
B3	Trimmer Cap.		Horiz. Drive (40-370MMF)
	Cabinet	97.543	Models 17L1, 17L2, 17L2LO
	Cabinet	97.543-E	Model 17L2EB
	Cabinet	97.552	Models 21L1, 21L2, 21L2LO
	Cabinet	97.552-E	Model 21L2EB
	Cabinet	97.407	Model 17KD
	Cabinet	92.529	Model 21KA
	Cabinet	97.506	Models 21K1, 21K1LO
	Knob	142.95	Brightness - Models 17L., 17L2, 17L2LO, 21L1, 21L2, 21L2LO, 17KD, 21KA, 21K1, 21K1LO
	Knob	142.95-E	Brightness - Models 17L2EB, 21L2EB
	Knob	142.94	Vert. Hold and contrast - Models 17L1, 17L2, 17L2LO, 21L1, 21L2, 21L2LO, 17KD, 21KA, 21K1, 21K1LO
	Knob	142.94-E	Vert. Hold and contrast - Models 17L2EB, 142.94-E
	Knob	142.93	On-off-volume and horiz. hold - Models 17L1, 17L2, 17L2LO, 21L, 21L2, 21L2LO, 17KD, 21KA, 21K1, 21K1LO
	Knob	142.93-E	On-off-volume and horizontal hold - Models 17L2EB, 21L2EB
	Knob	142104	Channel Selector - Models 17L1, 17L2, 17L2LO, 21L, 21L2, 21L2LO, 21KA, 21K1, 21K1LO
	Knob	142.104-E	Channel Selector - Models 17L2EB, 21L2EB
	Knob	142.91	Channel Selector - Model 17KD
	Knob	142.98	Fine tuning - Models 17L1, 17L2, 17L2LO, 21L1, 21L2, 21L2LO, 17KD, 21KA, 21K1, 21K1LO
	Knob	142.98-E	Fine tuning - Models 17L2EB, 21L2EB
	Safety Glass	92.594	Models 17L1, 17L2, 17L2LO, 17L2EB,
	Safety Glass	92.604	Models 21L1, 21L2, 21L2LO , 21L2EB
	Safety Glass	92.463	Model 17KD
	Safety Glass	92.588	Model 21KA
	Safety Glass	92.566	Models 21K1, 21K1LO
	Mask	97.544	Models 17L1, 17L2, 17L2LO
	Mask	97.544-E	Model 17L2EB
	Mask	97.553	Models 21L1, 21L2, 21L2LO
	Mask	97.553-E	Model 21L2EB
	Mask	97.514	Models 21KA, 21K1, 21K1LO
	Mask	97.417-2	Model 17KD

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TROUBLE SHOOTING AIDS (cont)

HIGH VOLTAGE

LOSS OF HIGH VOLTAGE

Check by substitution V12, V13, V14 and V15. Check M1 fuse. Check waveform W12.

If Satisfactory	If Unsatisfactory
Check T3, T5A, C72, C71, C73, R74, R75 and other associated components.	Check L22, C66, C67, C68, C70, R71, R70, R66 and other associated components.

INSUFFICIENT HIGH VOLTAGE

Check by substitution V13, V14 and V16. Check C70, R71, R75, T3 and other associated components.

BLOOMING

Check by substitution V13, V14, V15 and V16. Check C70, C72, R74, R75 and other associated components.

GENERAL

RASTER, SOUND, NO PICTURE

Follow procedure outlined under "Loss Of Video".

RASTER, PICTURE, NO SOUND

Follow procedure outlined under "Weak Or No Sound".

RASTER, NO SOUND, NO PICTURE

Check by substitution V1, V2, V3, V4, V5 and V6. Check video IF components for failure or change of value.

NO RASTER, NO SOUND

Follow procedure outlined under "Dead Set".

KEYSTONE EFFECT

Check T5 and its associated components.

INTERMITTENT STREAKS

Check high voltage section for corona discharge and arcing.

Symptoms shown are assumed and are not indicative of the quality and workmanship of this equipment.

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustments of the VHF tuner oscillator circuit may be accomplished by removal of the channel selector and fine tuning knobs. The adjustments are accessible, one at a time, thru the small hole in the cabinet to the right of the channel selector shaft.

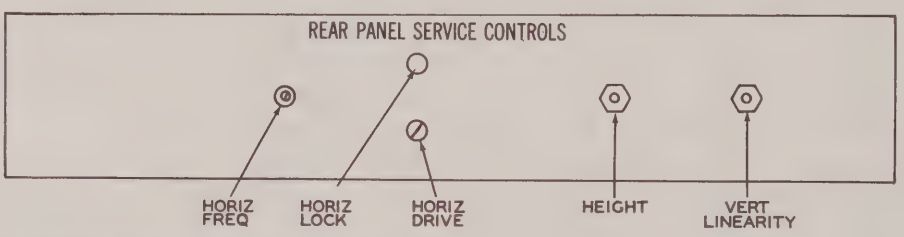
PICTURE TUBE SAFETY GLASS CLEANING

To clean safety glass remove 4 wood screws holding 2 wood strips on each side of the safety glass. Remove wood strips and safety glass. Use extreme caution when removing safety glass.

PICTURE TUBE REMOVAL

Remove safety glass, control knobs and mask. Remove rear cover, ion trap and centering magnet. Disconnect picture tube socket and HV lead. Remove 4 tube cradle mounting bolts. Slide picture tube straight out.

SERVICE ADJUSTMENT LOCATION



HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

Adjustment of the horizontal oscillator circuit can be made from the rear panel of the chassis. Set the horizontal hold control at the mid-range position and adjust the horizontal frequency slug (L22) until the picture synchronizes horizontally.

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate sound IF detector buzz, adjust the ratio detector secondary (L21) located on top of chassis. (See tube placement chart).

FUSES

One fuse is used for horizontal sweep circuit protection. (For location see tube placement chart).

CENTERING

Centering is accomplished mechanically by adjusting two magnetic rings around the neck of the picture tube, located flush against the deflection yoke. Rotate the two rings around the neck of the tube until the picture is properly centered.

DISASSEMBLY INSTRUCTIONS

1. Remove 7 push-on type control knobs from front panel.
2. Remove 9 wood screws. Remove rear cover.
3. Disconnect speaker plug, HV lead, picture tube socket and ground lead from front of chassis.
4. Remove 2 wood screws. Remove antenna bracket.
5. Remove 4 chassis bolts. Remove chassis.
6. Remove 2 speaker nuts. Remove speaker.

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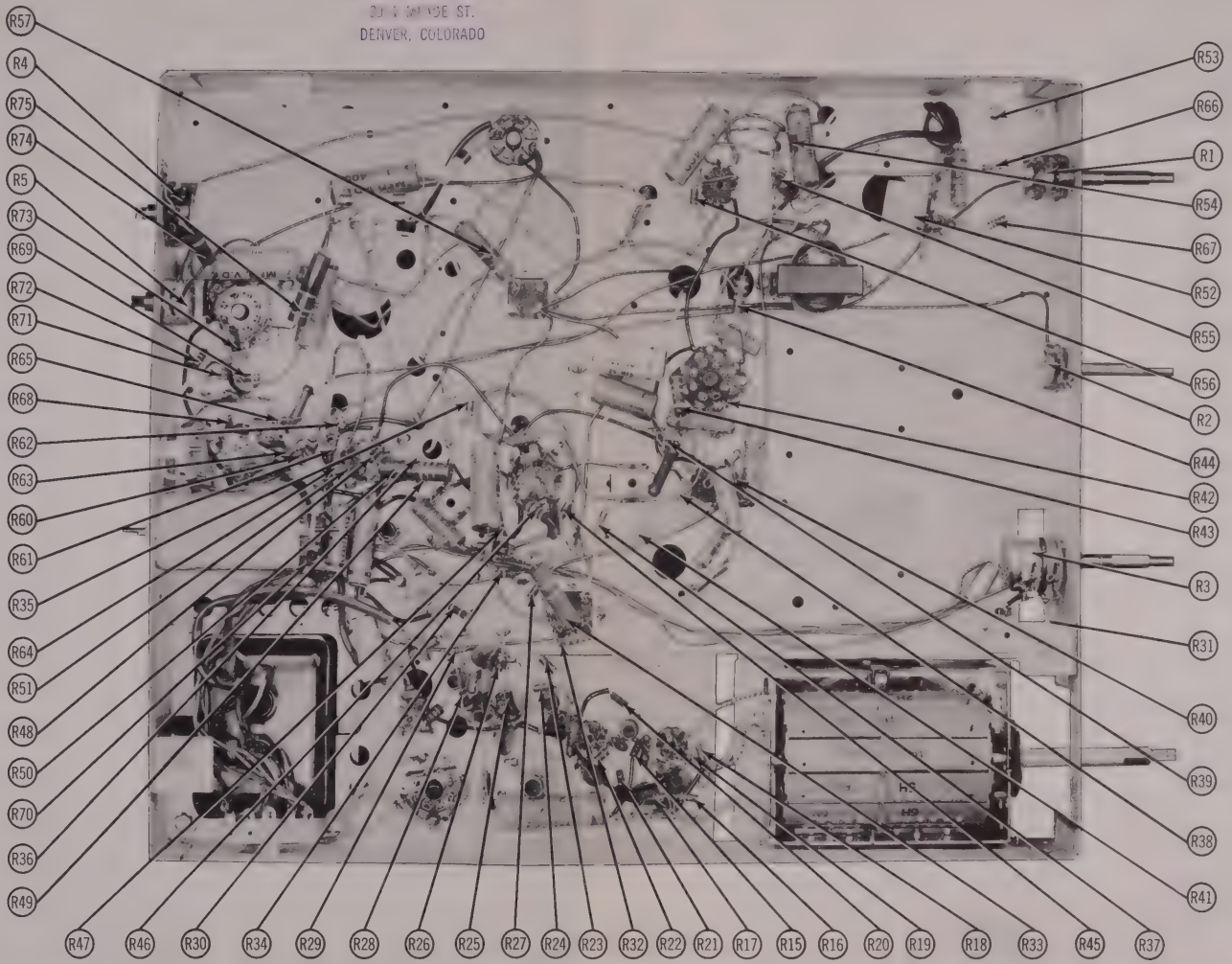
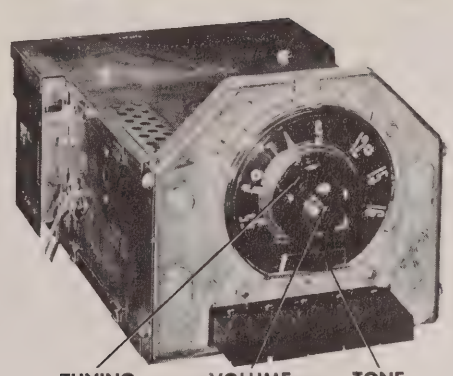


CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

FORD
MODEL 5MF (FDH-18805-B2)



PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

TRADE NAME	Ford Model 5MF (FDH-18805-B2) For 1955 Ford Autos
MANUFACTURER	Motorola, Inc., 4545 Augusta Blvd., Chicago, Ill.
TYPE SET	Battery Operated Custom Built AM Automobile Superheterodyne Receiver
TUBES (Six)	Types 6BA6 RF Amp., 6BE6 Conv., 6BA6 IF Amp., 6AV6 Det.-AVC-AF Amp., 6AQ5 Output, 6X4 Rectifier
POWER SUPPLY	6 Volt Storage Battery RATING 6 Amp. @ 6.3 Volts DC
TUNING RANGE—BROADCAST	540KC-1600KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
Loop should be maintained in same relative position to chassis as when receiver is in cabinet.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1MFD	High side to pin 7 (grid) of 6BE6 (V2). Low side to chassis.	265KC (400%Mod)	High freq. end stop	Across voice coil	A1, A2, A3, A4	Adjust for maximum output. *
	* Before proceeding with step 2 back tuner cores (A8, A9, A10) 1 3/8" out of coils to eliminate any effect on trimmer adjustment (A5, A6 and A7).						
2.	Fig. 1	Thru dummy to antenna receptacle.	1605KC	High frequency end stop	Across voice coil	A5, A6, A7	Adjust for maximum output.
3.	"	"	1200KC	Tuning manually, back carriage off 9/32" from "Hi" end stop	"	A8, A9, A10	Adjust for maximum output in order given using alignment tool shown in Fig. 2.
4.	"	"	1605KC	High frequency end stop	"	A5, A6, A7	Retouch for maximum output. Repeat steps 3 and 4 until no further increase is noticed. Cement cores in place.
5.				Weak station near 1400KC		A7	With receiver installed and antenna fully extended adjust A7 for maximum volume.

PUSHBUTTON ADJUSTMENTS

1. Turn receiver on and allow it to operate for fifteen minutes.
2. Unlock pushbuttons by pulling them out.
3. Accurately tune in a desired station.
4. Lock one of the pushbuttons to this station by pushing it firmly in.
5. Repeat steps 3 and 4 until all five pushbuttons are set.

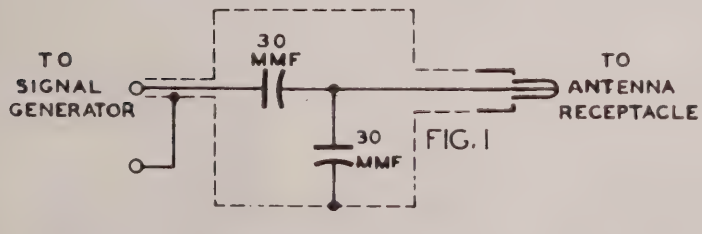


FIG. 1

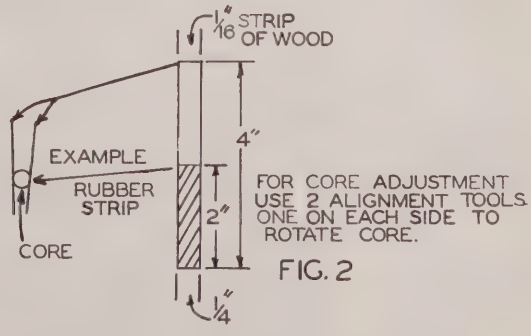


FIG. 2

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		MOTOROLA PART No.	STANDARD REPLACEMENT		
V1	RF Amplifier	6BA6	6BA6	7BK	
V2	Converter	6BE6	6BE6	7CH	
V3	IF Amplifier	6BA6	6BA6	7BK	
V4	Det.-AVC-AF Amp.	6AV6	6AV6	7BT	
V5	Audio Output	6AQ5	6AQ5	7BZ	
V6	Rectifier	6X4	6X4	5BS	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT	MOTOROLA PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1A	▲10	350	23A485677			FP328	TM-3026	T-455	
B	■15	350							
C	20	25							
C2	120		21R114167						
C3	27		21R410089	TCZ-27	NP0L-270				
C4	.05	200	8R121005	DF-503		PT415	IMP4-S5	330215	
C5	8.2		21R120547		NP0A-8R2				
C6	22			TCN-22	N750K-220				Note 1
C7	.05	400	8R121567	DF-503		PT415	IMP4-S5	330415	
C8	.01	400	8R121002	D6-103	811-01	PT411	IMP4-S1	330411	
C9	4.7		21R115955	TCZ-4R7	NP0A-4R7	DC3054R7			
C10	.02	200	8R121003	DF-203	817-02	PT412	IMP4-S2	330412	
C11	.01	400	8R121002	D6-103	811-01	PT411	IMP4-S1	330411	
C12	.01	400	8R121002	D6-103	811-01	PT411	IMP4-S1	330411	
C13	.003	600	8R121569	D6-302	811-003	PT623	IMP6-D3	330623	
C14	330	500	21R2744			MCK-333		K-1333	
C15	.003	600	8R121569	D6-302	811-003	PT623	IMP6-D3	330623	
C16	.02	1000	8R121004			PT1612	CT10-S2		
C17	.5	100	8K121666			PT405	IMP2-P5	330405	

Note 1. Not used in some versions.

CONTROLS

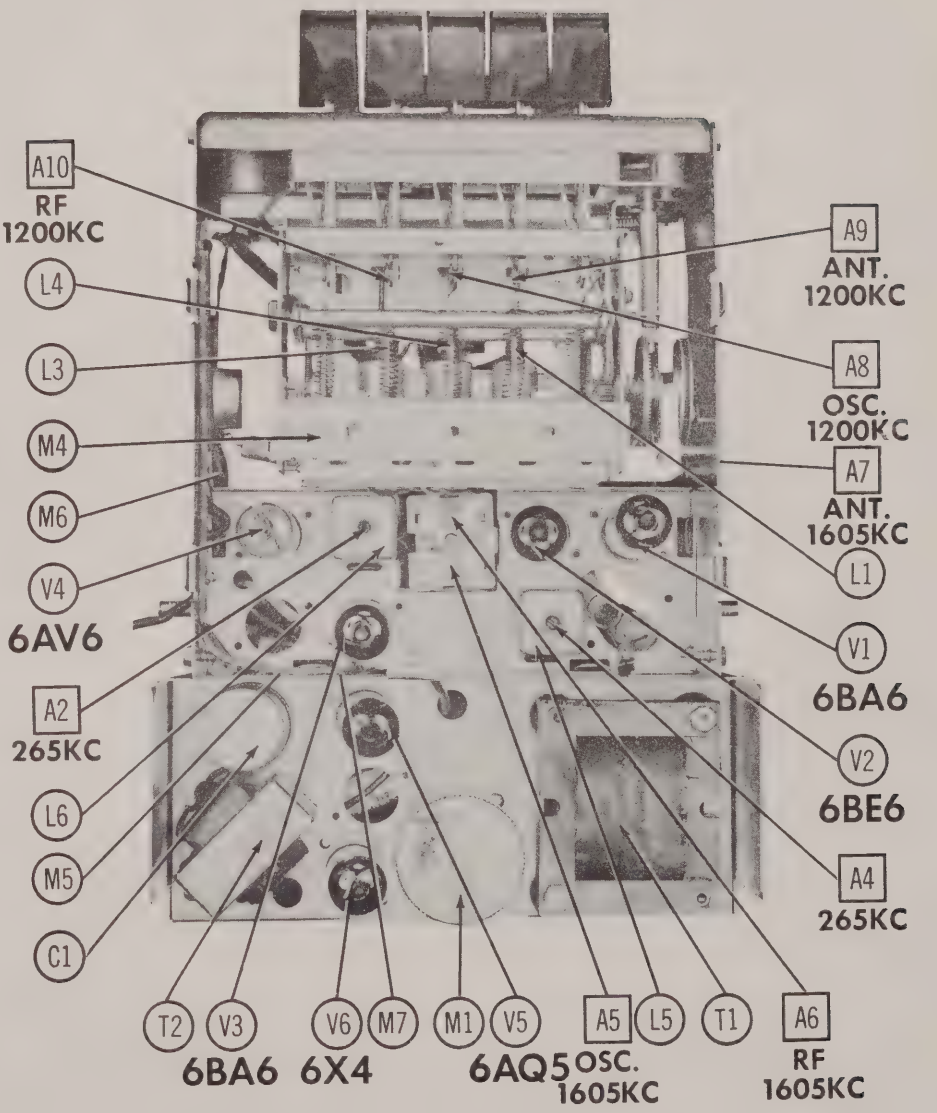
ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	MOTOROLA PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R1	250KΩ	½	18B531299					Volume & Switch - tapped @ 100KΩ
R2	1Meg	½	18A531459					Tone
R3	2000Ω	1	18K520298		39-2000			Sensitivity - wire-wound

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	MOTOROLA PART No.	IRC PART No.	
R4	470KΩ	½	6R6032	BTS-470K	
R5	10KΩ	1	6R6430	BTA-10K	
R6	330KΩ	½	6R6014	BTS-330K	
R7	47KΩ	½	6R6056	BTS-47K	
R8	22KΩ	1	6R6289	BTA-22K	
R9	12KΩ	1	6K533221	BTA-12K	
R10	47KΩ	½	6R6056	BTS-47K	
R11	1Meg	½	6R6004	BTS-1Meg	
R12	2.2Meg	½	6R3927	BTS-2.2Meg	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	MOTOROLA PART No.	IRC PART No.	
R13	12KΩ	½	6R6394	BTS-12K	
R14	4.7Meg	½	6R2122	BTS-4.7Meg	
R15	39Ω	½	6R2085	BTS-39	
R16	1Meg	½	6R6004	BTS-1Meg	
R17	220KΩ	½	6R6015	BTS-220K	
R18	220Ω	1	6R6389	BTA-220	
R19	2200Ω	1	6A533220	BTA-2200	
R20	56Ω	½	6R5614	BTS-56	
R21	56Ω	½	6R5614	BTS-56	

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (VIBRATOR)

ITEM No.	RATING				REPLACEMENT DATA					
	PRI.	SEC. 1	SEC. 2	SEC. 3	MOTOROLA PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	6.3VCT @3.8A	466VCT .046A			25C532402-A 25C532402 ①			P-6481		V-16K ②

① Alternate power transformer.
② Drill new mounting holes.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	MOTOROLA PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	6.1KΩ	4.1Ω	25B530217A 25B530217 ①	Z1113	A-2930	A-3877	24S51	S-3X	① Alternate audio output

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	MOTOROLA PART No.	QUAM PART No.	
SP1	6 x 9"	PM	4.1Ω	50D530699 50C530699 ①	69A2	① Alternate PM speaker

COILS (RF-IF)

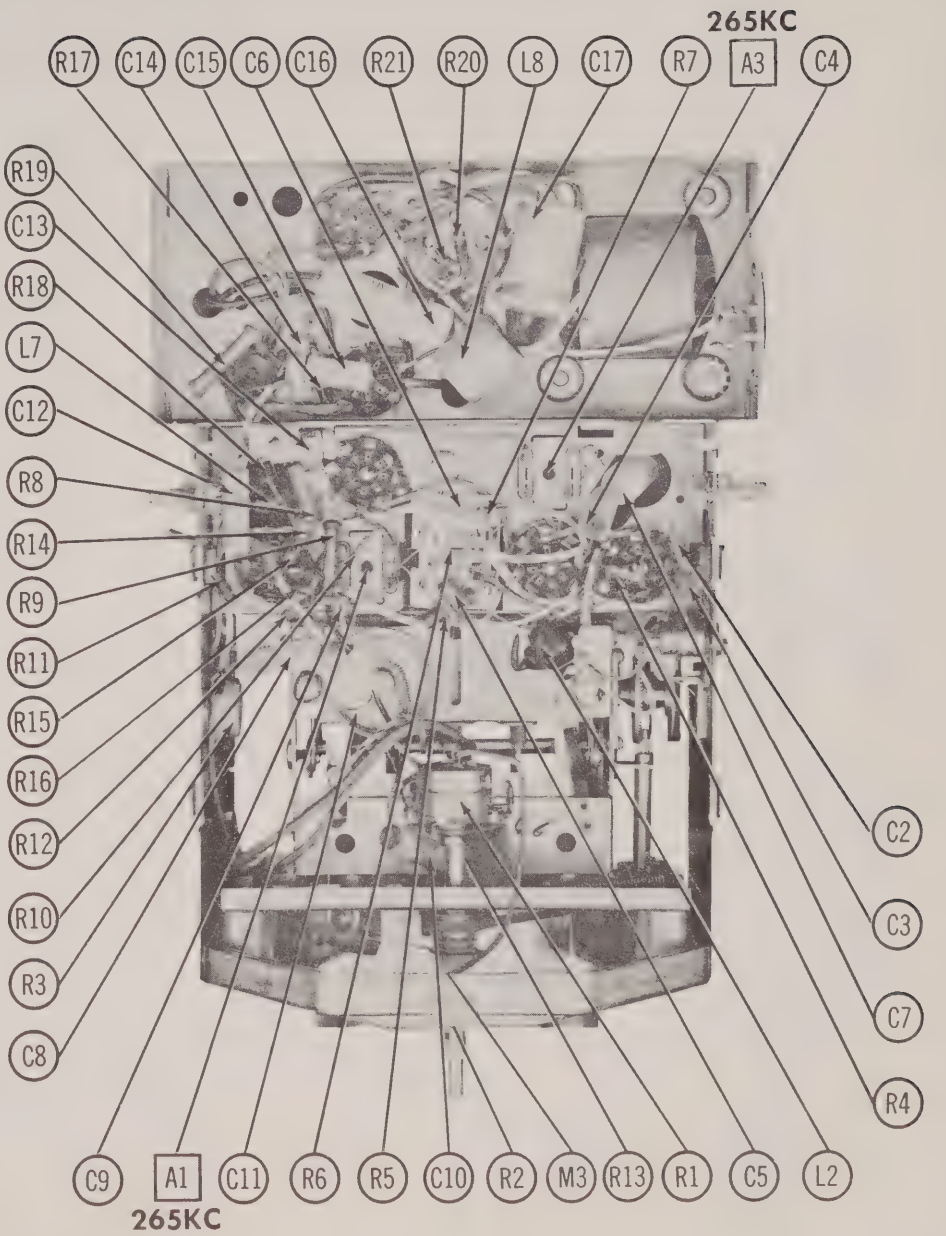
ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	MOTOROLA PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Ant. Coil	13Ω		24K533629 ■				Core part #76K533627
L2	IF Trap			24K512718				
L3	RF Coil	13Ω		24K533629 ■				Core part #76K533627
L4	Osc. Coil	1.2Ω	3.2Ω	24K533628 ▲				Core part #76K533630
L5	Input IF	44Ω	44Ω	24B532152	16-6752	BC-350	12-H1	
L6	Output IF	42Ω	42Ω	24K532153	16-6754	BC-354	12-H6	
L7	Fil. Choke	.3Ω		24A532084				160 Microhenries
L8	Vib. Hash Choke	.1Ω		24A532093				18 Microhenries

■ Coil part #24K533607 used in some versions (core part #76K533605).
▲ Coil part #24K533606 used in some versions (core part #76K533608).

VIBRATOR

ITEM No.	TYPE	INPUT VOLTS	FREQUENCY	REPLACEMENT DATA				NOTES
				MOTOROLA PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	RADIART PART No.	
M1	Interrupter	6.3V	115∿	48B3333	5342	903M	5342	

CHASSIS—BOTTOM VIEW



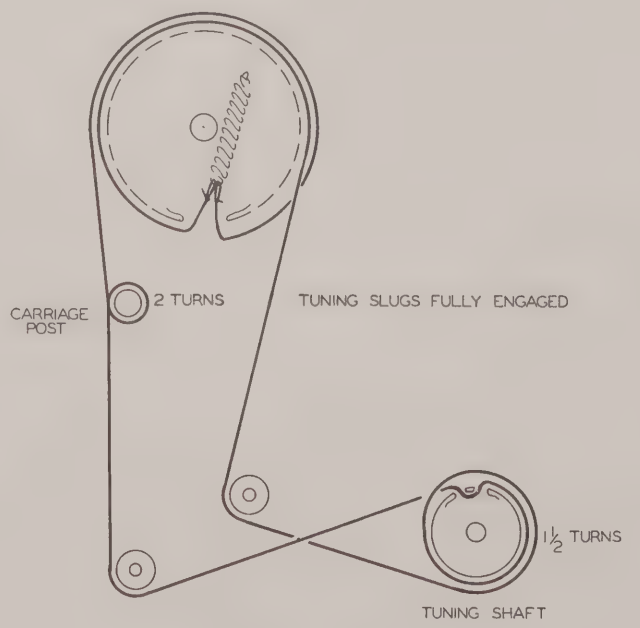
PARTS LIST AND DESCRIPTIONS (Continued)

FUSES

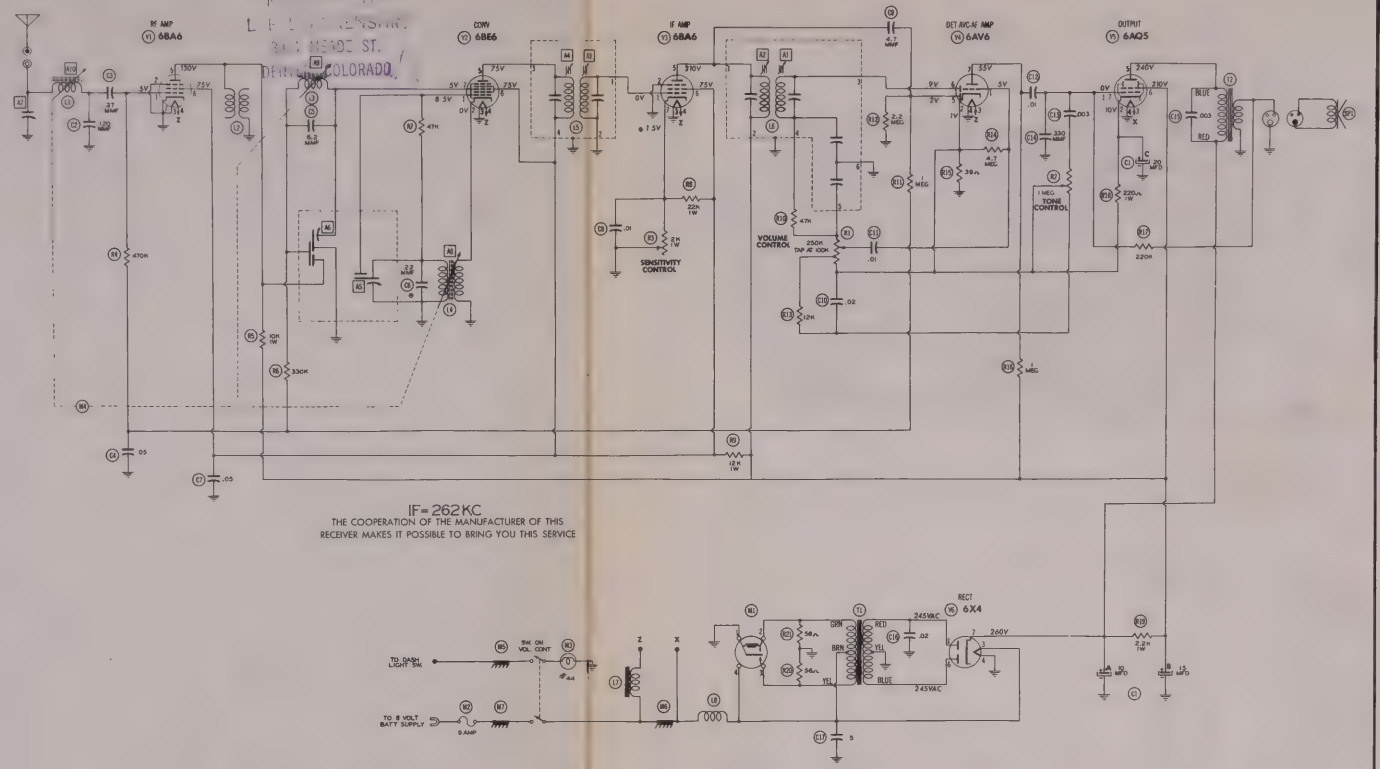
ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			MOTOROLA PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M2	SFE	9A 32V	65K16248	9C532485	307009 (SFE-9A)	155009	SFE9	HRH

MISCELLANEOUS

ITEM No.	PART NAME	MOTOROLA PART No.	NOTES
M3	Dial Light	65X10867	#44
M4	Tuner	77D532088	Complete - Includes L1, L2, L3 - Not used in all versions
	Tuner	77K533569	Complete - Includes L1, L2, L3 - used in some versions
M5	Spark Plate	64K532087	Dial Light lead
M6	Spark Plate	64K532087	"A" lead
M7	Spark Plate	64K532087	"A" lead
	Trimmer Cap.	20B532483	Dual (Osc. trimmer 420-500MMF) and RF trimmer 5-90MMF). Unit also consists of two 47MMF and one 220MMF fixed capacitors
	Trimmer Cap.	20B530768	Ant. (5-80MMF)
	Knob	1B531467	On-off-volume
	Knob	36B531469	Tone
	Knob	36B531466	Tuning
	Pushbutton	38B531129	5 used
	Dial Scale	1B532364	
	Dial Pointer	52B531465	
	Dial Background	64C532010	



DIAL CORD STRINGING



IF = 262 KC

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	6BA6	3.7Meg	0Ω	0Ω	.1Ω	†12.2KΩ	†14.2KΩ	0Ω
V 2	6BE6	47KΩ	.1Ω	0Ω	.1Ω	†14.2KΩ	†14.2KΩ	3.2Meg
V 3	6BA6	40Ω	0Ω	0Ω	.1Ω	†2.2KΩ	†14.2KΩ	*160Ω
V 4	6AV6	4.7Meg	39Ω	.1Ω	0Ω	2.2Meg	300KΩ	†1Meg
V 5	6AQ5	220KΩ	260Ω	.1Ω	0Ω	†550Ω	†2.2KΩ	220KΩ
V 6	6X4	400Ω		0Ω	.1Ω		400Ω	40KΩ

† MEASURED FROM PIN 7 OF V6

* SENSITIVITY CONTROL SET AT MAXIMUM SENSITIVITY

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measurements are taken with set operating, antenna negative.
4. Battery voltage maintained at 6.3 volts for voltage readings.
5. Normal tolerance on components values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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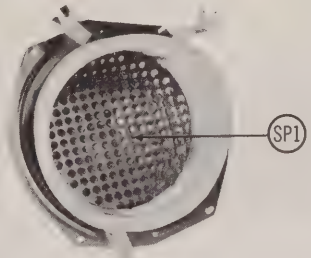

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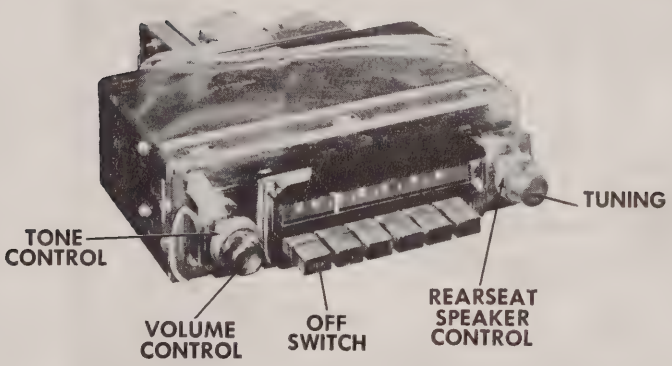
DENVER, COLORADO



MOPAR
MODELS 833, 834, 836

TRADE NAME	Mopar Models 833 (Dodge D55, D56), 834 (Desoto S21, S22), 836 (Plymouth P26, P27)
MANUFACTURER	Motorola, Inc., 4545 Augusta Blvd., Chicago 51, Ill.
TYPE SET	Battery Operated Custom Built AM Superheterodyne Automobile Receivers
TUBES (Eight)	Types 6BA6 RF Amp., 6BE6 Conv., 6BA6 IF Amp., 6AV6 Det-AVC-AF Amp., 6C4 Phase Inv., (2) 6AQ5 Output, 6X4 Rectifier
POWER SUPPLY	6 Volt Storage Battery — RATING 8 Amp. @ 6.3 Volts DC
TUNING RANGE—BROADCAST	540KC - 1610KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
Tone control at mid-position.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1MFD	High side to pin 7 (grid) of 6BE6 (V2). Low side to chassis.	262KC (400~ Mod)	High frequency end of dial.	Across voice coil.	A1, A2, A3, A4 *	Adjust for maximum output.
2.	Fig. 1	Thru dummy to ant. receptacle.	1615KC	"	"	A5, A6 A7	"
3.	"	"	1000KC	Back tuner core carriage 25/32" from end stop.	"	A8, A9, A10	Adjust for maximum output. (Use alignment tool part no. 66A76278.)
4.				Weak signal near 1400KC.			With receiver installed and antenna fully extended, adjust A7 for maximum volume.

POINTER ADJUSTMENT

Tune to 1000KC signal. Adjust cam so pointer is lined up with calibration mark on dial.

PUSHBUTTON ADJUSTMENTS

1. Turn receiver on and allow to operate for fifteen minutes. Antenna should be fully extended.
2. Unlock pushbuttons by pulling them to the left and out.
3. Accurately tune in a station with the manual tuning.
4. Lock one pushbutton to that station by pushing firmly in.
5. Repeat above procedure for remaining pushbuttons.

* Remove escutcheon to expose tuner cores. Back tuner cores completely out.

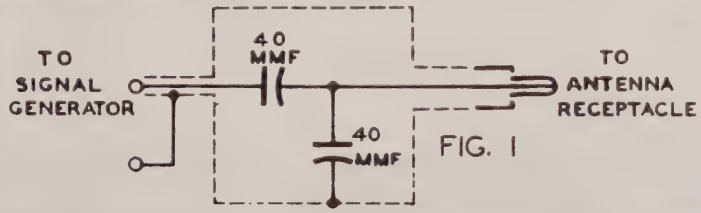


FIG. 1

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		MOTOROLA PART No.	STANDARD REPLACEMENT		
V1	RF Amp.	6BA6	6BA6	7BK	
V2	Converter	6BE6	6BE6	7CH	
V3	IF Amp.	6BA6	6BA6	7BK	
V4	Det-AVC-AF Amp.	6AV6	6AV6	7BT	
V5	Phase Inv.	6C4	6C4	6BG	
V6	Audio Output	6AQ5	6AQ5	7BZ	
V7	Audio Output	6AQ5	6AQ5	7BZ	
V8	Rectifier	6X4	6X4	5BS	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT	MOTOROLA PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1A	20	350	23A532094			FP345.8	TM-3029	T-470	
B	20	350							
C	20	25							
C2	27		21R120567	TCN-27	N750K-270				
C3	.05	200	8R121005	DF-503		PT415	IMP2-S5	330215	
C4	.05	400	8R121567	DF-503		PT415	IMP4-S5	330415	
C5	56		21R120152		N330L-560				
C6	100		21R115042						
C7	.006	400	8R121001	D6-602	GP3-333-602	PT626	IMP6-D3	330626	
C8	330		21R410118	DD-331	811-331	UC-5333		K-1333	
C9	.01	400	8R121002	D6-103	GP3-333-103	PT411	IMP4-S1	330411	
C10	.25	100	8R122045			AS164	CT2-P25	3302025	
C11	.1	200	8R121573	DF-104		PT401	CT2-P1	330201	
C12	.006	400	8R121001	D6-602	GP3-333-602	PT626	IMP6-D6	330626	
C13	.01	400	8R121002	D6-103	GP3-333-103	PT411	IMP4-S1	330411	
C14	.01	400	8R121002	D6-103	GP3-333-103	PT411	IMP4-S1	330411	
C15	.003	600	8R121569	D6-302	GP3-333-302	PT623	IMP6-D3	330623	
C16	.02	1000	8R121004	DF-203	817-02	PT1612	CT10-S2		
C17	.5	100	8R121666			RF480	CT2-P5	330205	
C18	.5	100	8R121666			RF480	CT2-P5	330205	

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	MOTOROLA PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R1A	*	½	18K5333014				UF106L †	Tone - Panel - Note 1
B	500KΩ	½					UR55A †	Volume - Rear
R2	25Ω	2	18K533300					Rear Speaker (Wire wound) - Note 2

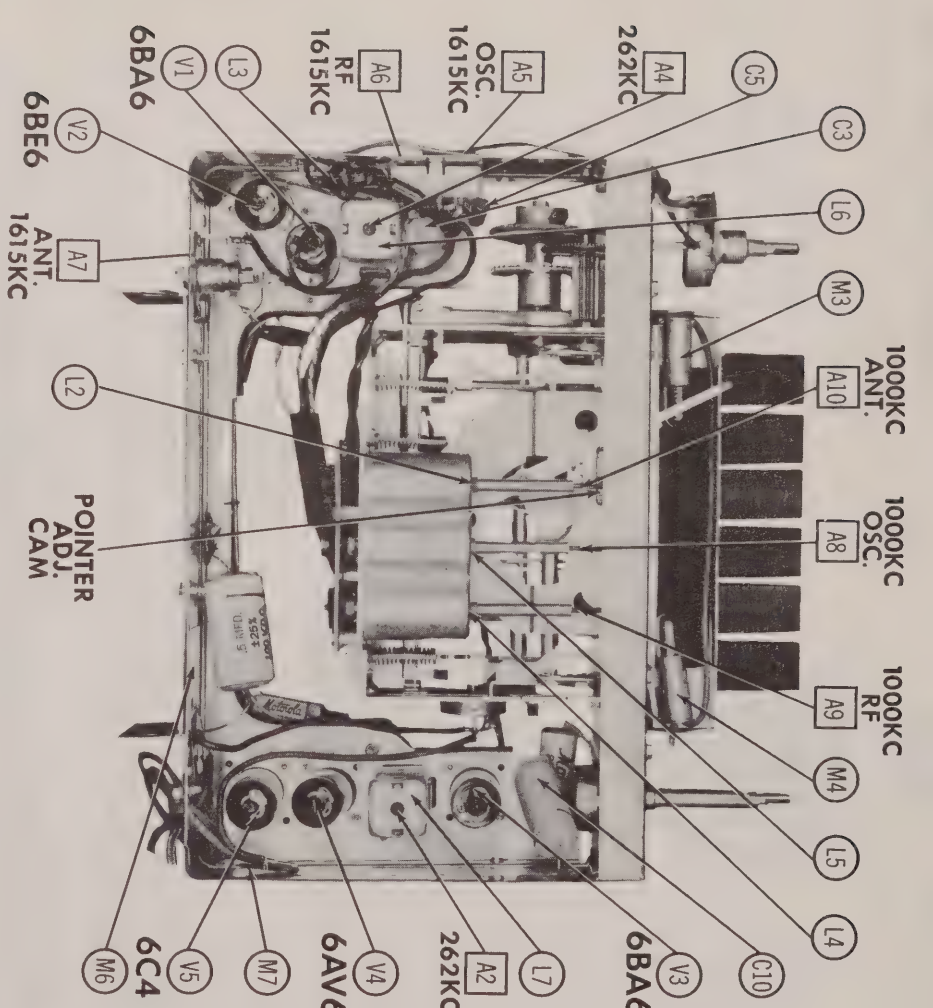
* This control is open in center - 2Meg each side of center.
Note 1: Model 833 will use control part no. 18K533013 in this application.
Also model 834 will use control part no. 18K532659 in this application.
Note 2: Models 833 and 834 will use control part no. 18B532919 in this application.
† Universal replacement (Mallory exact duplicate part no. UE2200)

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	MOTOROLA PART No.	IRC PART No.	
R3	470KΩ	½	6R6032	BTS-470K	
R4	10KΩ	1	6K6430	BTA-10K	
R5	330KΩ	½	6R6014	BTS-330K	
R6	22KΩ	½	6R6028	BTS-22K	
R7	220Ω	½	6R6270	BTS-220	
R8	12KΩ	1	6K533221	BTA-12K	
R9	47KΩ	½	6R6056	BTS-47K	
R10	1Meg	½	6R6004	BTS-1Meg	
R11	180Ω	½	6R5660	BTS-180	
R12	15Meg	½	6R488264	BTS-15Meg	
R13	220KΩ	½	6R6015	BTS-220K	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	MOTOROLA PART No.	IRC PART No.	
R14	2200Ω	½	6R6069	BTS-2200	
R15	15Meg	½	6R488264	BTS-15Meg	
R16	220KΩ	½	6R6407	BTS-220K	
R17	220KΩ	½	6R6407	BTS-220K	
R18	470KΩ	½	6R6377	BTS-470K	
R19	330Ω	1	6R6254	BTA-330	
R20	470KΩ	½	6R6377	BTS-470K	
R21	2200Ω	1	6A533220	BTA-2200	
R22	68Ω	½	6R6007	BTS-68	
R23	68Ω	½	6R6007	BTS-68	

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA					
	PRI.	SEC. 1	SEC. 2	SEC. 3	MOTOROLA PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	6.3VCT @ 3.6A	486VCT .031A			25C532631-A 25C532631 ①					

① Alternate power transformer.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	MOTOROLA PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	6.2KΩ CT	3.2Ω	25B533038-A 25B533038 ①	Z1004 ②	A-2900 ②	A-3850 ②	24S60 ②	S-51X ②	① Alternate audio output. ② Fabricate mounting.

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	MOTOROLA PART No.	QUAM PART No.	
SP1	7"	PM	3.2Ω	50C533835 ① 50B533217 ②	7A31	① Use in Models 836 ② Alternate 7" PM speaker used in Model 836
	6" X 9"	PM	3.2Ω	50C533214 ③	69A2	③ Used in Models 833 and 834

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	MOTOROLA PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	RF Choke	4.5Ω		24A532418	19-6033		4628	30 Microhenries
L2	Ant. Coil	8.5Ω		24K534075				
L3	IF Trap	11Ω		24B532979	19-4201		6154	207 Microhenries
L4	RF Coil	8.5Ω		24K534076				
L5	Osc. Coil	1Ω	3.5Ω	24K534077				
L6	Input IF	36Ω	36Ω	24B580193	16-6752	BC-350	12-H1	
L7	Output IF	36Ω	36Ω	24K591267	16-6754	BC-354	12-H6	
L8	Vib. Hash Choke	0Ω		24A532093				18 Microhenries

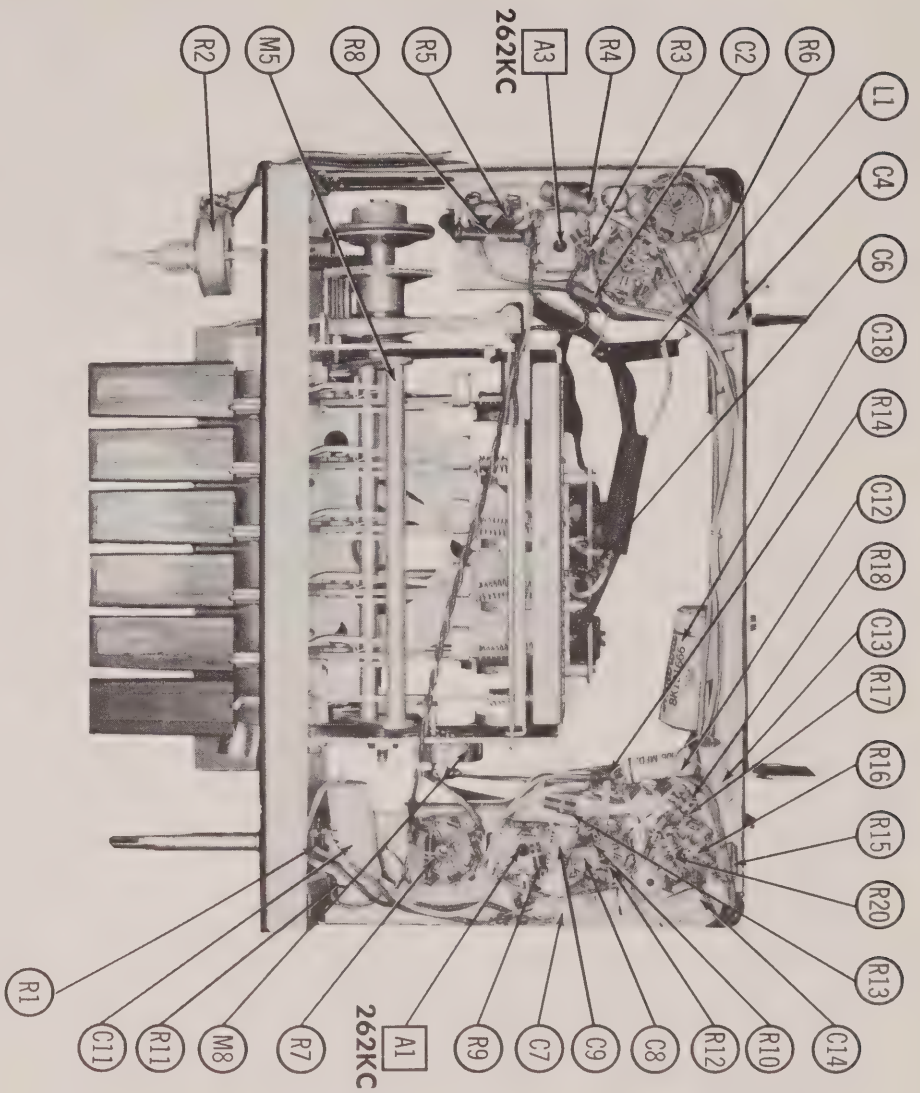
VIBRATOR

ITEM No.	TYPE	INPUT VOLTS	FREQUENCY	REPLACEMENT DATA				NOTES
				MOTOROLA PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	RADIART PART No.	
M1	Interrupter	6.3V	115v	48B3333	5342	903M	5342	

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			MOTOROLA PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M2	SFE	14A 32V	65K12894	9K533158	307014	155014	SFE 14	HR1

CHASSIS—BOTTOM VIEW

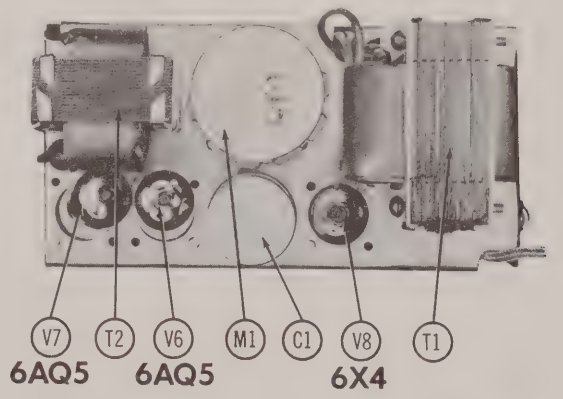


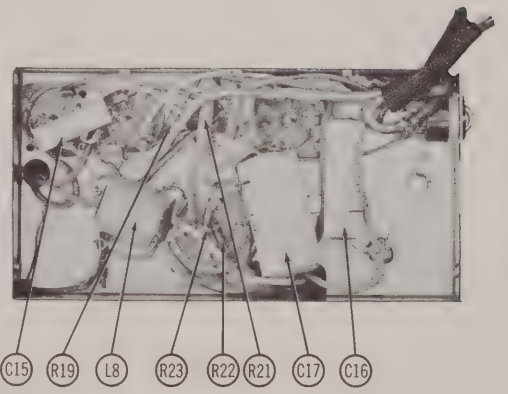
PARTS LIST AND DESCRIPTIONS (Continued)

MISCELLANEOUS

ITEM No.	PART NAME	MOTOROLA PART No.	NOTES
M3	Dial Light	65X11854	#47, Models 833 & 836
	Dial Light	65X10867	#55, Model 834
M4	Dial Light	65X11854	#47, Models 833 & 836
	Dial Light	65X10867	#55, Model 834
M5	Tuner	77K533059	Complete - Model 836
	Tuner	77E533057	Complete - Model 834
	Tuner	77K533058	Complete - Model 833
M6	Spark Plate	65K530177	
M7	Spark Plate	64K530177	
M8	Switch	40K534023	On-Off
	Trimmer Cap.	20K533409	Dual (Osc. Trimmer -160MMF Nom.) & (RF Trimmer - 120MMF Nom.) Unit also consists of the following fixed capacities: 68MMF, 265MMF & 47MMF.
	Trimmer Cap.	20B532899	Ant. (20-150MMF)
	Knob	36B532949	Rear Speaker & Tone - Model 833
	Knob	36B532951	Rear Speaker & Tone - Model 834
	Knob	36B533005	Rear Speaker & Tone - Model 836
	Knob	1V533109	Volume & Tuning - Model 833
	Knob	1V532877	Volume & Tuning - Model 834
	Knob	1V533308	Volume & Tuning - Model 836
	Pushbutton Ass'y.	1K533598	Model 833
	Pushbutton Ass'y.	1B533596	Model 834
	Pushbutton Ass'y.	38B533284	Model 836
	Pushbutton Ass'y.	1K533599	"Off" - Model 833
	Pushbutton Ass'y.	1K533597	"Off" - Model 834
	Pushbutton Ass'y.	38K533285	"Off" - Model 836
	Crystal	61K532894	Dial - Model 836
	Crystal	61K532893	Dial - Model 833
	Dial Scale	34K532974	Model 833
	Dial Scale	34B532807	Model 834
	Dial Scale	34K533019	Model 836
	Pointer Ass'y.	45K534024	Models 836 & 834
	Pointer Ass'y.	45K534025	Model 833

POWER SUPPLY CH. TOP VIEW





POWER SUPPLY CH. BOTTOM VIEW

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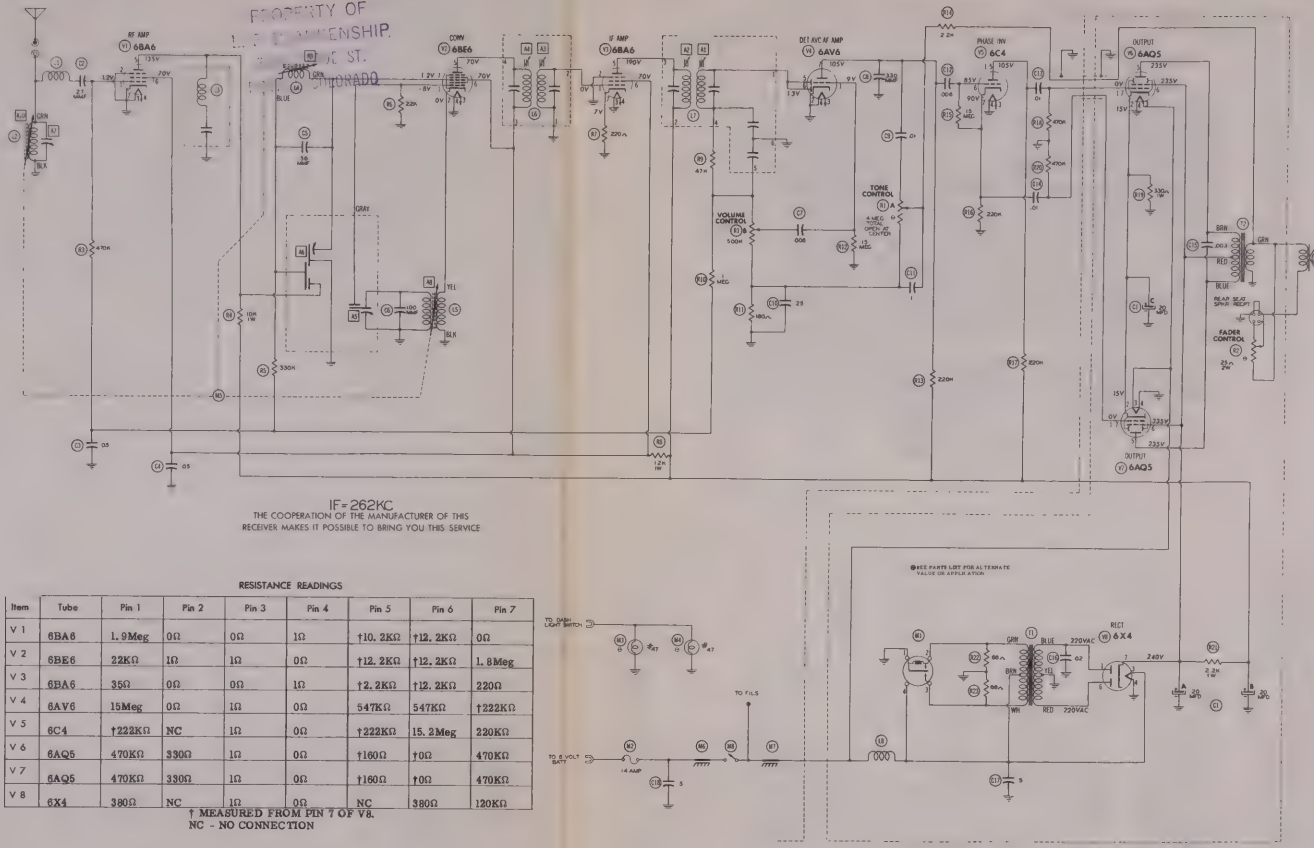

IF = 262KC

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	6BA6	1.9Meg	0Ω	0Ω	1Ω	†10.2KΩ	†12.2KΩ	0Ω
V 2	6BE6	22KΩ	1Ω	1Ω	0Ω	†2.2KΩ	†2.2KΩ	1.8Meg
V 3	6BA6	35Ω	0Ω	0Ω	1Ω	†2.2KΩ	†2.2KΩ	220Ω
V 4	6AV6	15Meg	0Ω	1Ω	0Ω	547KΩ	547KΩ	†222KΩ
V 5	6C4	†222KΩ	NC	1Ω	0Ω	†222KΩ	15.2Meg	220KΩ
V 6	6AQ5	470KΩ	330Ω	1Ω	0Ω	†160Ω	†0Ω	470KΩ
V 7	6AQ5	470KΩ	330Ω	1Ω	0Ω	†160Ω	†0Ω	470KΩ
V 8	6X4	380Ω	NC	1Ω	0Ω	NC	380Ω	120KΩ

† MEASURED FROM PIN 7 OF V8.
NC - NO CONNECTION

1. DC voltage measurements taken with Hickok tube voltmeter, 20K ohms per volt.
2. All voltages measured at 120 volts per line.
3. Measurements are from socket terminals to chassis ground.
4. Resistance readings are from socket terminals to chassis ground.
5. Readings obtained with receiver turned off.
6. Variable resistance or components shown adjustable to obtain indicated voltage and resistance readings.
7. Tuning control at maximum, no signal applied for voltage measurements.

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PHOTOFACT* Folder

*TRADE MARK

SILVERTONE MODELS 3136, 3181, 3185
(Ch. 100.425-2, -4, -6, -8)

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MODEL 3181

SILVERTONE MODELS 3136, 3181, 3185
(Ch. 100.425-2, -4, -6, -8)

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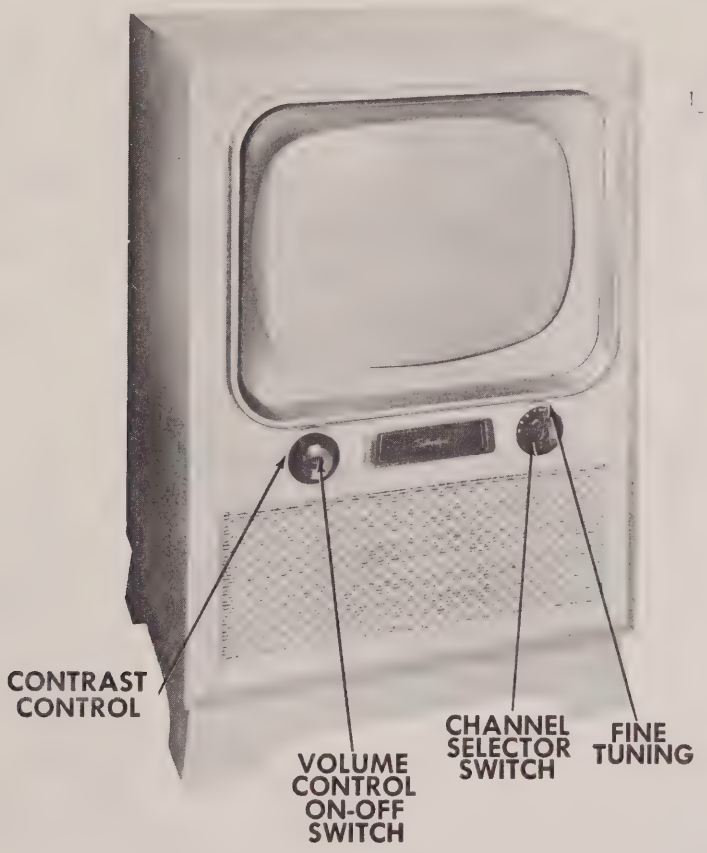

SILVERTONE MODEL 3181

TRADE NAME	Silvertone Models 3136, 3181, 3185 (Ch. 100. 425-2, -4, -6, -8)
SUPPLIER	Sears Roebuck & Co., 925 S. Homan Ave., Chicago, Ill.
TYPE SET	Television Receiver
TUBES	Twenty
POWER SUPPLY	110-120 Volts AC - 60 Cycle RATING 1. 75 Amp. @ 117 Volts AC
TUNING RANGE	Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 45. 75MC, Sound IF 41. 25MC (Intercarrier)

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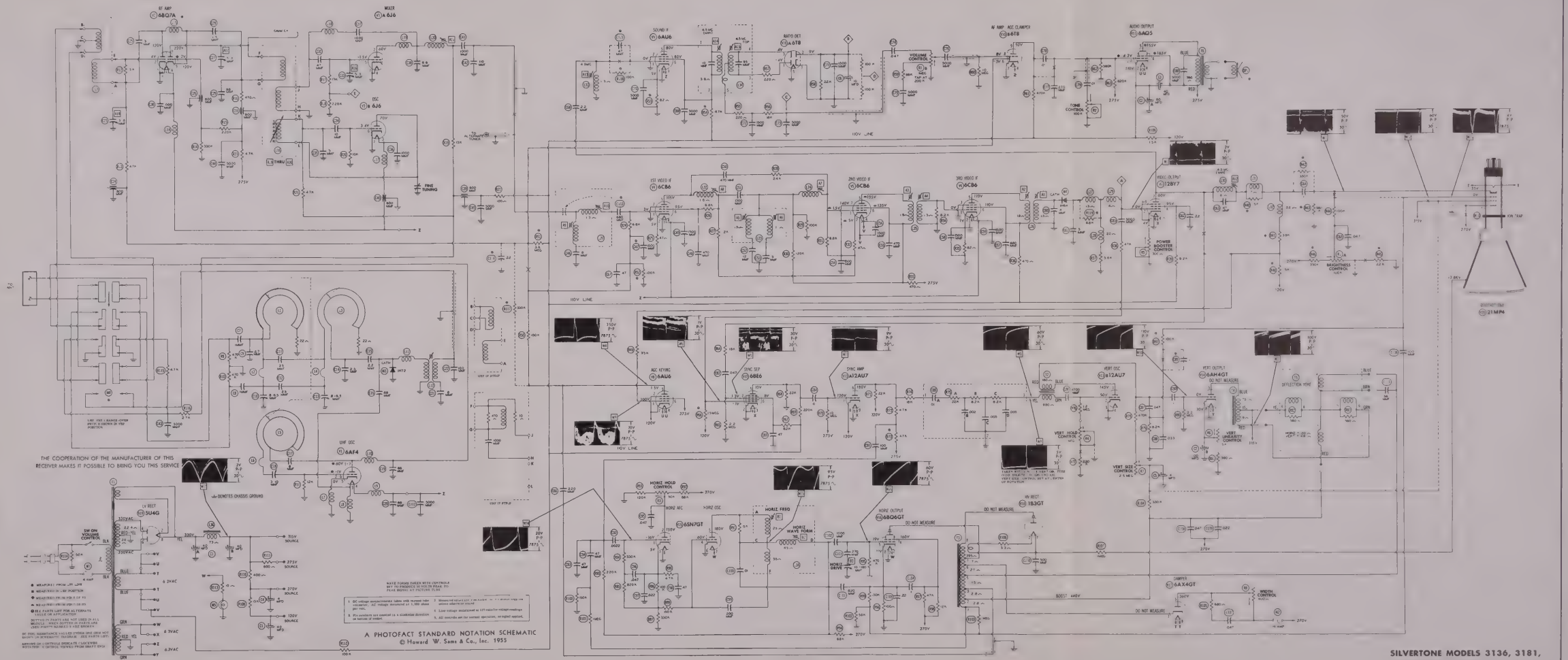
SILVERTONE MODELS 3136, 3181, 3185
(Ch. 100.425-2, -4, -6, -8)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DENOTES CHASSIS GROUND
A PHOTOFACT STANDARD NOTATION SCHEMATIC
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SILVERTONE MODELS 3136, 3181, 3185 (Ch. 100.425-2, -4, -6, -8)

SILVERTONE MODELS 3136, 3181, 3185 (Ch. 100.425-2, -4, -6, -8)

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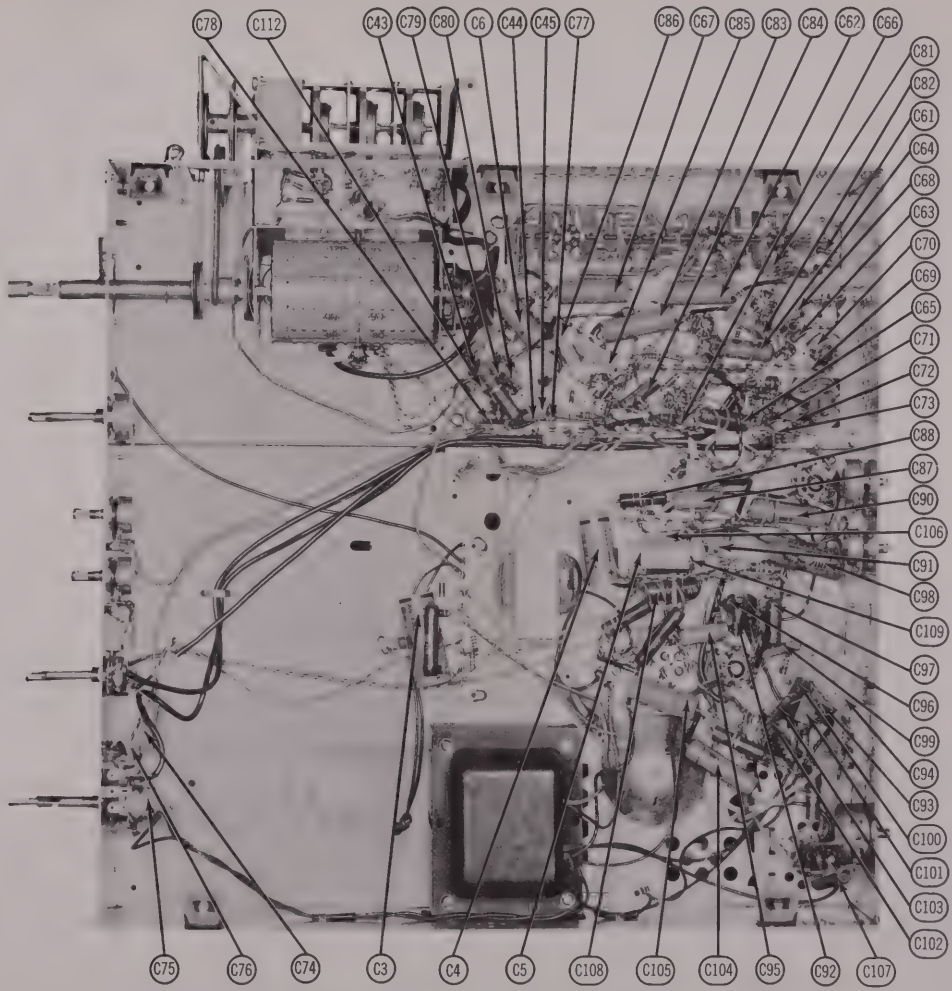
CHASSIS TOP VIEW

SILVERTONE MODELS 3136, 3181,
3185 (Ch. 100.425-2, -4, -6, -8)



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CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

TUBE PLACEMENT CHART

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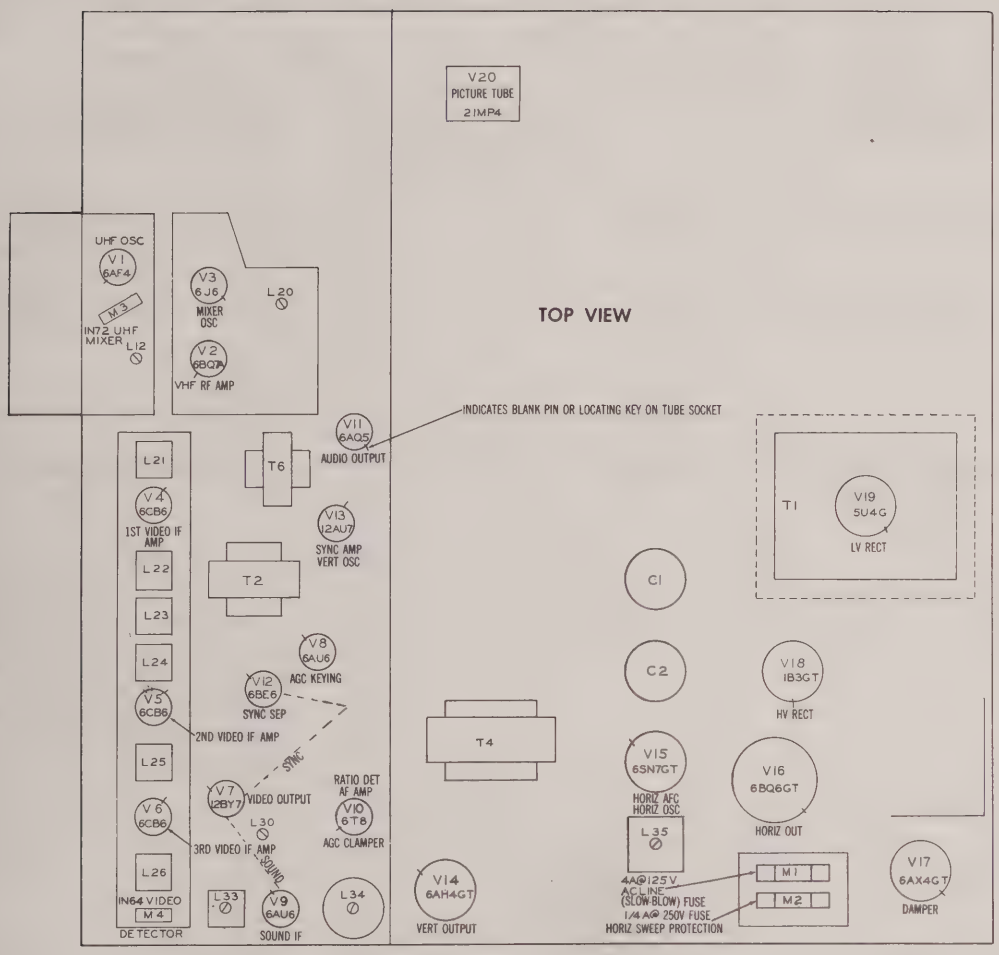

TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound - V19 Fuse (M1)

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - V3, V4, V5, V6, V7, V11, (V1 UHF only)
No pic, no sound, has snow - V2, V3, V4
No pic, has sound, has raster - V7, V8, V20
Has pic, no sound - V9, V10, V11
Overloaded picture - V8, V10

SYNC FAILURE
No vert. sync - V13
No horiz. sync - V13, V15
No vert. or horiz. sync - V12, V13

SWEEP FAILURE
No raster, has sound - V15, V16, V17, V18, V20, Fuse (M2)
No vertical deflection - V13, V14
Poor vert. linearity or foldover - V13, V14
Poor horiz. linearity or foldover - V15, V16, V17
Narrow picture - V15, V16, V17, V18, V19
Vert. off freq. - V13
Horiz. off freq. - V13, V15

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

The high voltage lead should be securely taped and kept away from the chassis. Do not remove the horizontal oscillator tube (V15) to disable the high voltage. Connect a .001MFD capacitor across the vertical input terminals of oscilloscope.

VIDEO IF ALIGNMENT

The local oscillator should be disabled to reduce the possibility of erroneous indications. To do this remove the tuner bottom shield and place a strip of transparent cellulose tape across the first two contacts (from front) of an unused channel strip then switch the tuner to this insulated channel strip.
Short the antenna terminals to chassis. Connect VTVM across the vertical input terminals of the oscilloscope.
Attenuate the sweep generator output to maintain not more than 1 volt at VTVM.
If a separate marker generator is used couple its output loosely to the sweep generator output cable. Set power booster control fully counter clockwise.
Connect the synchronized sweep voltage from the sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	Direct	High side to pin 1 (grid) of 6CB6 (V6). Low side to chassis.	45MC (10MC Swp)	42MC 45MC	Channel with insulated channel strip	Vert. Amp. thru 10KΩ to point (A). Low side to chassis. (Connect VTVM across scope vert. input).	A1, A2	Attach detuning clip (alligator clip) to pin 5 (plate) of V5. Adjust for maximum amplitude response curve similar to Fig. 1. Remove detuning clip.
2.	100MMF	High side to pin 1 (grid) of 6CB6 (V5). Low side to chassis.	"	42.0MC 43.5MC 44.9MC	"	"	V3, V4	Connect the negative lead of a 3 volt battery to the ungrounded side of C67. Connect the positive lead to chassis. Adjust for maximum amplitude response curve similar to Fig. 2.
3.	Direct	High side to pin 1 (grid) of 6CB6 (V4). Low side to chassis.	Not used	41.25MC (Unmod)	"	"	A5	Disconnect bias battery from C67. Adjust for MINIMUM deflection on VTVM.
4.	"	"	"	47.25MC	"	"	A6	"
5.	"	"	45MC (10MC Swp)	42.5MC 44.5MC	"	"	A7, A8	Reconnect bias battery as in step 2. Adjust for maximum amplitude response curve similar to Fig. 3.
6.	"	High side to an ungrounded tube shield floating over converter tube (V3). Low side to tuner chassis.	Not used	39.75MC (Unmod)	"	"	A9	Disconnect bias battery from C67. Adjust for MINIMUM deflection on VTVM.
7.	"	"	45MC (10MC Swp)	42.5MC 44.5MC	"	"	A10, A11	Reconnect bias battery as in step 2. Adjust for maximum amplitude response curve similar to Fig. 4.
8.	"	"	"	39.75MC 41.25MC 45.75MC 47.25MC	"	"		Check for response curve similar to Fig. 5. If necessary, retouch A1 thru A4, A7, A8, A10 and A11 to obtain desired response. To check 39.75MC, 41.25MC and 47.25MC markers remove bias battery and use high scope gain and sweep generator output so that trap regions become visible on scope. If necessary, retouch A5, A6, and A9 to place markers in trap notches as in Fig. 5.

4.5MC TRAP ALIGNMENT

Remove V6 from its socket.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
9.	.001MFD	High side to point (A). Low side to chassis.	4.5MC (Unmod)	Any	DC probe thru detector (Fig. 6) to pin 11 of picture tube.	A12	Adjust for MINIMUM deflection.

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Connect two matched 100KΩ (±1%) resistors in series from point (B) to chassis. The junction of these two resistors is alignment point (D) as shown on the schematic.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
10.	.001MFD	High side to point (A). Low side to chassis.	4.5MC (Unmod)	Any	DC probe thru 10KΩ to point (B). Common to chassis.	A13, A14	Adjust for maximum deflection.
11.	"	"	"	"	DC probe thru 10KΩ to point (C). Common to point (D).	A15	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting. Replace V6 in its socket.

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60∿ modulation and 450KC sweep. Use 120∿ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
10.	.001MFD	High side to point (A). Low side to chassis.	4.5MC (450KC Swp)	4.5MC	Any	Vert. Amp. thru 10KΩ to point (B). Low side to chassis.	A13, A14	Disconnect stabilizing capacitor C6. Adjust for curve of maximum amplitude and symmetry similar to Fig. 7.
11.	"	"	"	"	"	Vert. Amp. thru 10KΩ to point (C). Low side to chassis.	A15	Reconnect stabilizing capacitor C6. Adjust so that 4.5MC occurs at center of crossover lines as in Fig. 8. SLIGHTLY retouch A14 for maximum amplitude and straightness of crossover lines. Replace V6 in its socket.

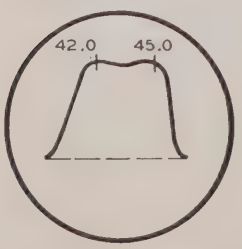

FIG. 1

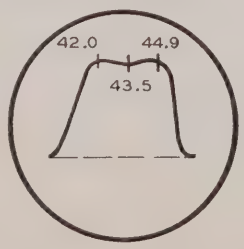

FIG. 2

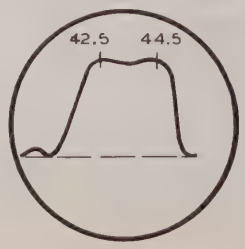

FIG. 3

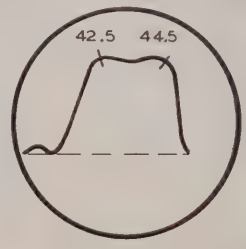

FIG. 4

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ALIGNMENT INSTRUCTIONS (cont)

VHF RF ALIGNMENT FOR TUNER PART NO. 521187

Remove the cellulose tape from the tuner channel strip. Leave the bias connected as under "Video IF Alignment".
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
12.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	195MC (10MC Swp)	193.25MC 197.75MC	10	Vert. Amp. thru 10KΩ to point (E). Low side to tuner chassis.	A16, A17 A18	Adjust for response curve similar to Fig. 9 with markers above 90%.
13.	"	"	213MC (10MC Swp)	211.25MC 215.75MC	13	"		If markers fall below 70% on any channel make compromise adjustment of A16, A17 and A18 with channel selector set to that channel, then check all other channels to see that they have not been seriously affected.
			207MC (10MC Swp)	205.25MC 209.75MC	12			
			201MC (10MC Swp)	199.25MC 203.75MC	11			
			189MC (10MC Swp)	187.25MC 191.75MC	9			
			183MC (10MC Swp)	181.25MC 185.75MC	8			
			177MC (10MC Swp)	175.25MC 179.75MC	7			
			85MC (10MC Swp)	83.25MC 87.75MC	6			
			79MC (10MC Swp)	77.25MC 81.75MC	5			
			69MC (10MC Swp)	67.25MC 71.75MC	4			
			63MC (10MC Swp)	61.25MC 65.75MC	3			
			57MC (10MC Swp)	55.25MC 59.75MC	2			

VHF OSCILLATOR ALIGNMENT FOR TUNER PART NO. 521187

The oscillator adjustment screws are reached through a hole just to the right of the channel switch shaft. The correct adjustment screw is accessible through this hole as the channel switch is turned to each channel. Leave bias battery connected as under "Video IF Alignment".
Connect a .001MFD capacitor across the vertical input terminals of oscilloscope.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
14.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	195MC (10MC Swp)	193.25MC 197.75MC	10	Vert. Amp. thru 10KΩ to point (A). Low side to chassis (Connect VTVM across scope vert. input).	A19	Attenuate sweep generator output to maintain not more than 1 volt at VTVM. Adjust to place sound marker in trap notch as in Fig. 10. Video marker should be at 50%.
			213MC (10MC Swp)	211.25MC 215.75MC	13		A20	
			207MC (10MC Swp)	205.25MC 209.75MC	12		A21	
			201MC (10MC Swp)	199.25MC 203.75MC	11		A22	
			189MC (10MC Swp)	187.25MC 191.75MC	9		A23	
			183MC (10MC Swp)	181.25MC 185.75MC	8		A24	
			177MC (10MC Swp)	175.25MC 179.75MC	7		A25	
			85MC (10MC Swp)	83.25MC 87.75MC	6		A26	
			79MC (10MC Swp)	77.25MC 81.75MC	5		A27	
			69MC (10MC Swp)	67.25MC 71.75MC	4		A28	
			63MC (10MC Swp)	61.25MC 65.75MC	3		A29	
			57MC (10MC Swp)	55.25MC 59.75MC	2		A30	

VHF RF ALIGNMENT FOR TUNER PART NO. 521150

Follow same alignment procedure as outlined under "VHF RF Alignment For Tuner Part No. 521187".

VHF OSCILLATOR ALIGNMENT FOR TUNER PART NO. 521150

Complete oscillator alignment may not be necessary. If the oscillator seems to be off frequency approximately the same amount for a majority of the channels, it may be possible to correct them in one step using A31.
It should be noted that this is an all channel oscillator circuit adjustment and should not be used to correct any individual channel.
If adjustment of A31 will not bring all channels well within the range of the fine tuning control it will be necessary to adjust the channel strip adjustment for each channel that is off frequency.
Follow the same alignment procedure as outlined under "VHF Oscillator Alignment For Tuner Part No. 521187.

UHF TUNER ALIGNMENT

The UHF portion of the receiver has been properly aligned at the factory and is very stable. If the UHF tuner is known to be out of alignment or is in need of major repair the entire unit including the tube should be returned to the factory service department.

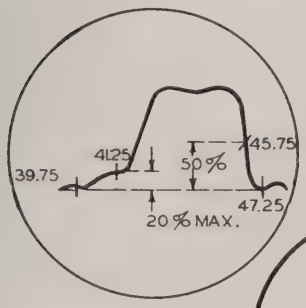


FIG. 5

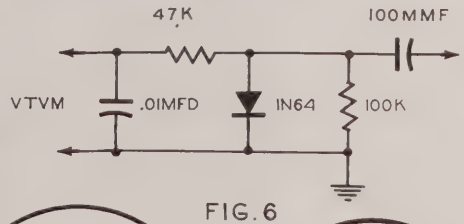


FIG. 6

FIG. 7

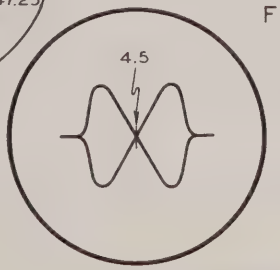


FIG. 8

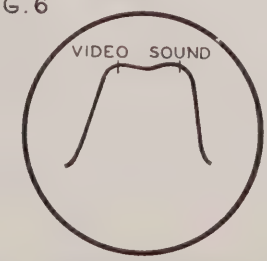


FIG. 9

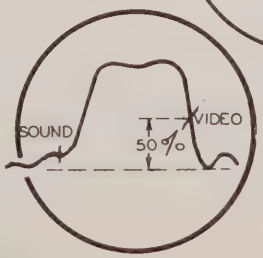


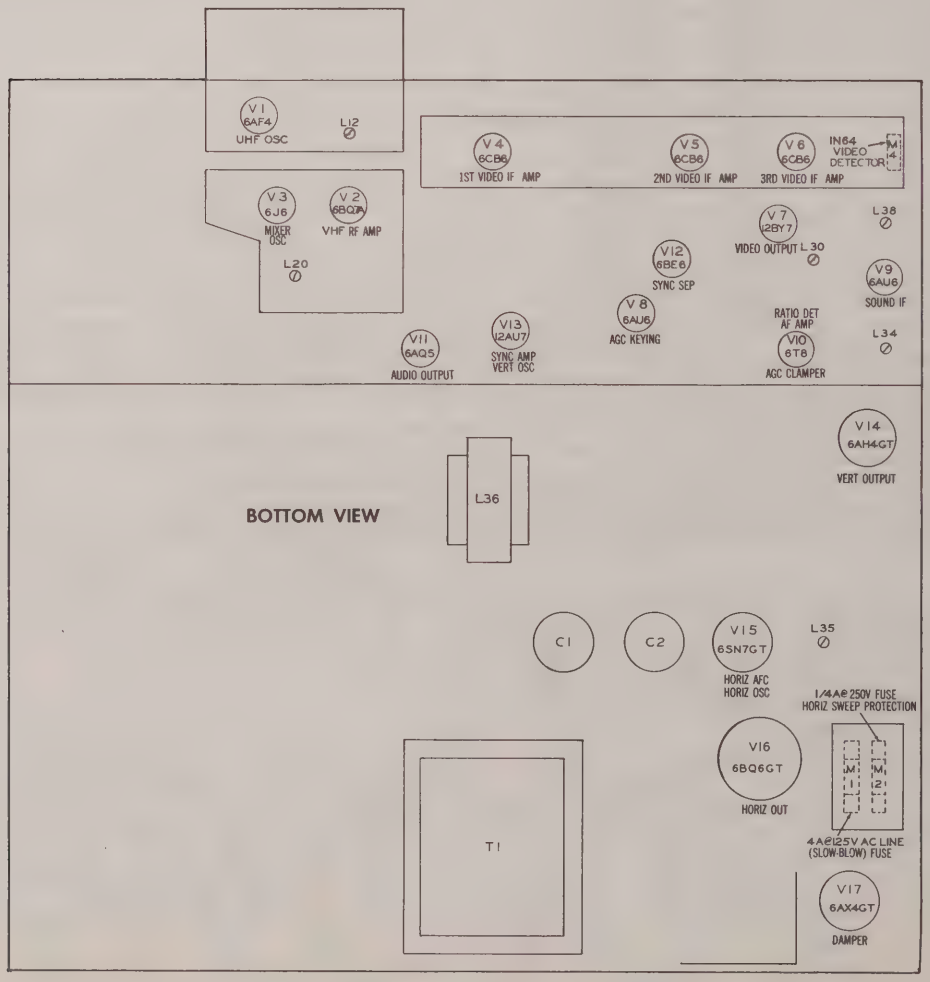
FIG. 10

SILVERTONE MODELS 3136, 3181, 3185 (Ch. 100.425-2, -4, -6, -8)

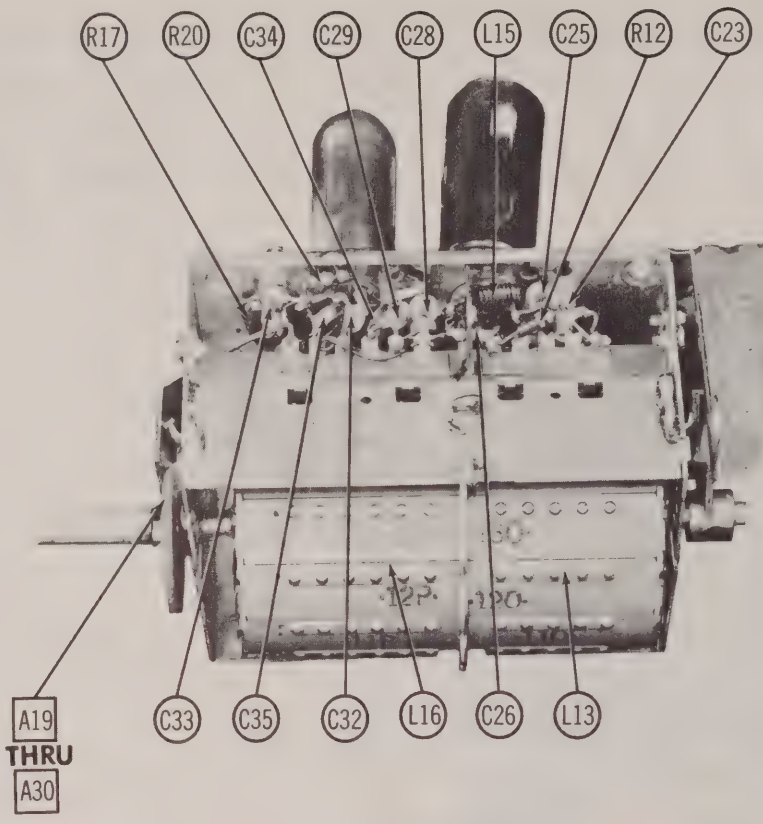
RESISTANCE MEASUREMENTS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6AF4	¶■2. 8KΩ	12KΩ	0Ω	. 1Ω	0Ω	12KΩ	¶■2. 8KΩ		
V 2	6BQ7A	INF.	100KΩ	0Ω	. 1Ω	0Ω	† 5. 8KΩ	160KΩ	INF.	0Ω
V 3	6J6	¶ 4. 8KΩ	¶ 15KΩ	. 1Ω	0Ω	235KΩ	10KΩ	0Ω		
V 4	6CB6	100KΩ	47Ω	0Ω	. 1Ω	♦L. 2KΩ	♦ 8KΩ	0Ω		
V 5	6CB6	♦6. 8KΩ	♦ 47Ω	¶ 100KΩ	¶ 100KΩ	† 1. 2KΩ	† 1. 2KΩ	100KΩ		
V 6	6CB6	1. 3Ω	82Ω	. 1Ω	0Ω	¶ 470Ω	¶ . 470Ω	0Ω		
V 7	12BY7	25Ω	5. 6KΩ	25Ω	. 1Ω	. 1Ω	0Ω	†15. 4KΩ	¶ 8. 2KΩ	25Ω
V 8	6AU6	† 50. 5KΩ	† 15KΩ	¶ 100KΩ	¶ 100KΩ	200KΩ	† 700Ω	† 15KΩ		
V 9	6AU6	1. 3Ω	0Ω	. 1Ω	0Ω	¶ 4. 7KΩ	¶ 4. 7KΩ	82Ω		
V 10	6T8	INF.	22KΩ	INF.	.1Ω	0Ω	100KΩ	0Ω	10Meg	¶ 470KΩ
V 11	6AQ5	400KΩ	† 12KΩ	¶ 100KΩ	¶ 100KΩ	† 1KΩ	† 700Ω	400KΩ		
V 12	6BE6	† 1. 5Meg	0Ω	. 1Ω	0Ω	¶ 40KΩ	¶ 82KΩ	2. 2Meg		
V 13	12AU7	▲ 2. 5Meg	2. 5Meg	0Ω	0Ω	0Ω	† 32KΩ	† 10Meg	† 10 KΩ	. 1Ω
V 14	6AH4GT	2. 2Meg	0Ω	† 12KΩ	2. 2Meg	† 820Ω	† 12KΩ	. 1Ω	2KΩ	
V 15	6SN7GT	1. 5Meg	† 80KΩ	430KΩ	480KΩ	† 68. 5KΩ	0Ω	. 1Ω	0Ω	
V 16	6BQ6GT	† 450Ω	. 1Ω	INF.	10KΩ	470KΩ	† 68. 5KΩ	0Ω	100Ω	TOP CAP ▲ 17Ω
V 17	6AX4GT	INF	† 1. 2KΩ	500KΩ	† 68. 5KΩ	† 550Ω	† 68. 5KΩ	† 12KΩ	† 12KΩ	
V 18	1B3GT	PINS 1-8 HAVE INF. RESISTANCE								TOP CAP ▲ 412Ω
V 19	5 U4G	INF.	20KΩ	INF.	21Ω	INF.	22Ω	INF.	20KΩ	
V 20	21MP4	¶ 100KΩ	108KΩ	PIN 6 † 450Ω	PIN 10 † 70Ω	PIN 11 † 200KΩ	PIN 12 ¶ 100KΩ			

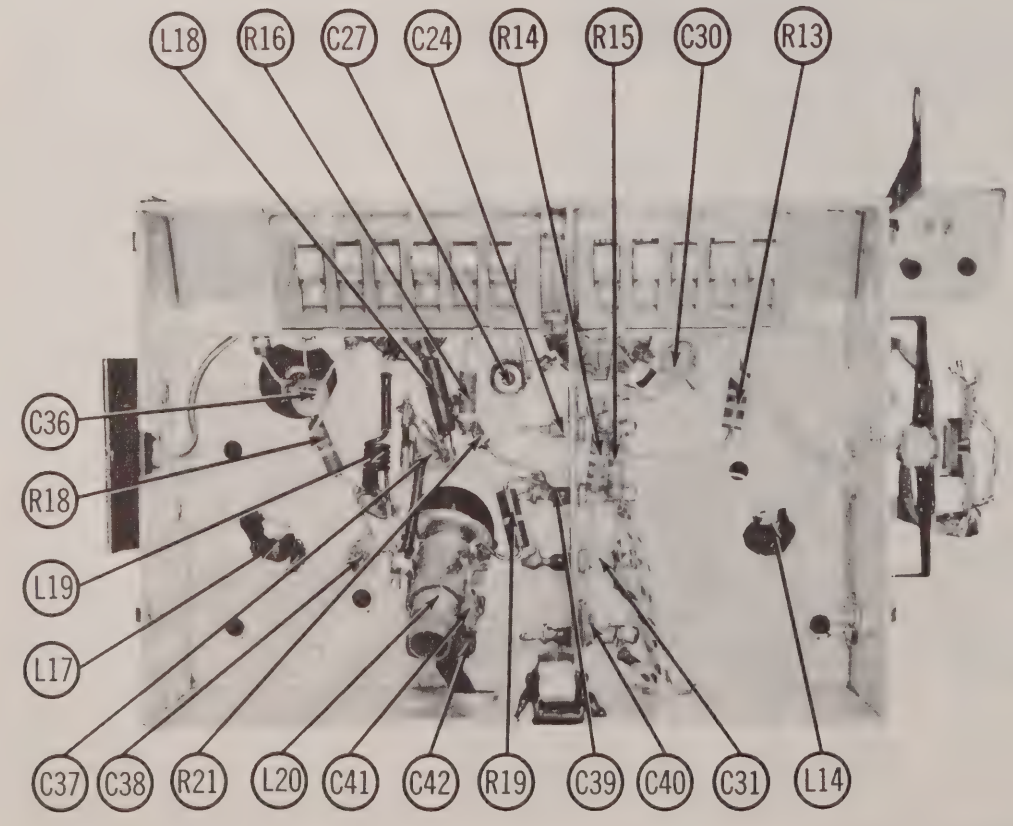
† MEASURED FROM PIN 8 OF V19.
■ MEASURED IN UHF POSITION.
♦ MEASURED FROM PIN 7 OF V5.
▲ MEASURED FROM PIN 3 OF V17.
¶ MEASURED FROM 110V LINE.



TUBE PLACEMENT CHART



VHF TUNER-RIGHT SIDE



VHF TUNER-BOTTOM VIEW

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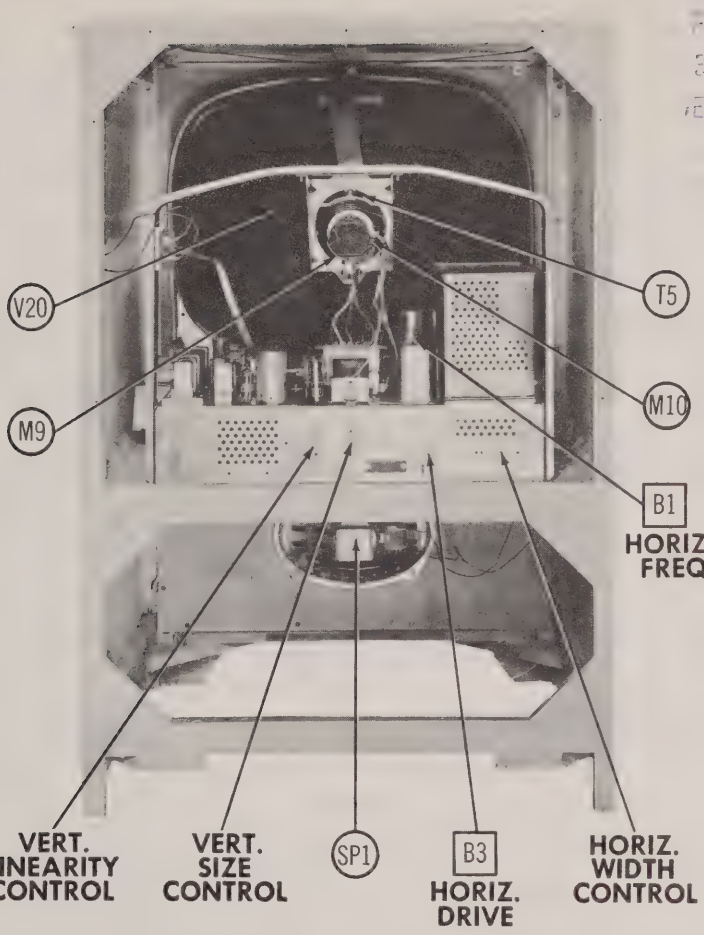


CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station, preferably a test pattern.

1. Set the horizontal hold control to its fully clockwise position.
2. Turn the horizontal frequency slug (B1) and the horizontal waveform slug (B2) fully counter clockwise.
3. Connect a short jumper from terminal "C" to terminal "D" of L35.
4. Set the horizontal drive trimmer (B3) one half turn from its fully clockwise position.
5. Adjust B1 clockwise until picture falls into sync.
6. Remove jumper from L35 and adjust B2 clockwise until picture again falls into sync.
7. Connect the high side of vertical amplifier input of scope thru 10MMF to terminal "C" of L35. Connect low side to chassis. Adjust B2 for waveform similar to Fig.11. If necessary keep the picture in sync while adjusting B2 by turning the horizontal hold control counter clockwise. Remove scope from L35.
8. Turn the horizontal hold control counter clockwise and adjust B1 until picture locks in horizontally and does not lose sync when switching off channel and back again. Then turn B1 slowly counter clockwise until picture is just ready to lose sync.
9. Horizontal holding action should be as follows:
   (a) With horizontal hold control fully counter clockwise switch off channel and back again. Picture may be just out of sync.
   (b) With horizontal hold control fully clockwise picture may lose sync when switching off channel and back again.
   (c) With horizontal hold control at or near its mid-range position, picture should remain in sync when switching off channel and back again.

Adjust the horizontal drive trimmer (B3) counter clockwise as far as possible without the presence of vertical white lines or compression near the center of the picture.

Adjust the horizontal width control for a picture slightly wider than necessary to fill the picture mask horizontally.

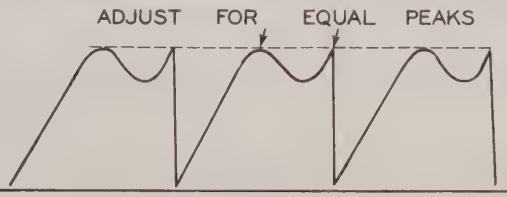


FIG. 11

TROUBLE SHOOTING AIDS

SWEEP

HORIZONTAL

LOSS OF SWEEP

Follow procedure outlined under "Loss of High Voltage".

INSUFFICIENT SWEEP

Check by substitution V16, V17 and V19. Check T3, T5A, R97, R98 and C102. Check B3 and R8. Check other associated components.

DRIVE LINES

Check by substitution V16 and V17. Adjust B3. Check R96, R97, R98, C102, C105 and other associated components.

COMPRESSED LEFT SIDE

Check by substitution V16 and V17. Check horizontal output and damper stages for component failure or change of value.

FOLDS

Follow procedure outlined under "Drive Lines".

PIE CRUST EFFECT

Check by substitution V15, V16 and V17. Check C93 for open. Check T3, T5A and other associated components.

XMAS TREE EFFECT

Check by substitution V15, V16 and V17. Check T3 and T5A for internal arcing. Check L35, C100, C99, R91, R92, R93, R94 and other associated components.

VERTICAL

LOSS OF SWEEP

Check by substitution V13 and V14. Check waveform W10.

If Satisfactory	If Unsatisfactory
Check T4, T5B, R6, R81 and other associated components.	Check C90, T2, R78, R7, and other associated components.

INSUFFICIENT SWEEP

Check by substitution V13 and V14. Check vertical size and vertical linearity controls for proper operation. Check T4 and T5B.

COMPRESSED AT BOTTOM

Check by substitution V13 and V14. Check R7, R78, T2, C90 and other associated components.

COMPRESSED AT TOP

Check by substitution V13 and V14. Check R81, R6, C2B and other associated components.

FOLDS

Check by substitution V13 and V14. Check C87, R79, R81 and other associated components.

SYNC

LOSS OF VERTICAL AND HORIZONTAL SYNC

Check by substitution V12 and V13. Check C82, C84, R64, R69, R71 and other associated components.

LOSS OF VERTICAL SYNC-HORIZONTAL SYNC SATISFACTORY

Check by substitution V12 and V13. Check waveform W8.

If Satisfactory	If Unsatisfactory
Check C86, R76, R77, R4 and other associated components.	Check vertical integrator for component failure or change of value. Check video IF alignment for overloading.

LOSS OF HORIZONTAL SYNC- VERTICAL SYNC SATISFACTORY

Check by substitution V15. Check C91, C92, C95, R92 and other associated components.

HORIZONTAL BENDING

Check by substitution V8, V12, V13 and V15. Check horizontal AFC network.

VIDEO

LOSS OF VIDEO

Check L30, L31, C64, R42, picture tube and other associated components.

SOUND BARS (4.5MC BEAT)

Adjust tuner fine tuning for best picture and sound. Check adjustment A12. Check video IF alignment.

POOR CONTRAST

Substitute V7. Check L31, R42, C64, contrast control, picture tube and other associated with V7. Check video IF alignment.

NEGATIVE PICTURE

Substitute V7. Check picture tube. Check video crystal detector network. Check AGC network.

SMEAR

Substitute V7. Check L28, L27, L31, L32, C64, R42 and other associated components.

WIDE BLACK BAR ACROSS PICTURE

Check by substitution V2, V4, V5, V6 and V7 for heater to cathode leakage.

AUDIO

WEAK OR NO SOUND

Check by substitution V10, V9 and V11. Check stages V9 and V11 using audio signal generator. Apply audio signal across R1B.

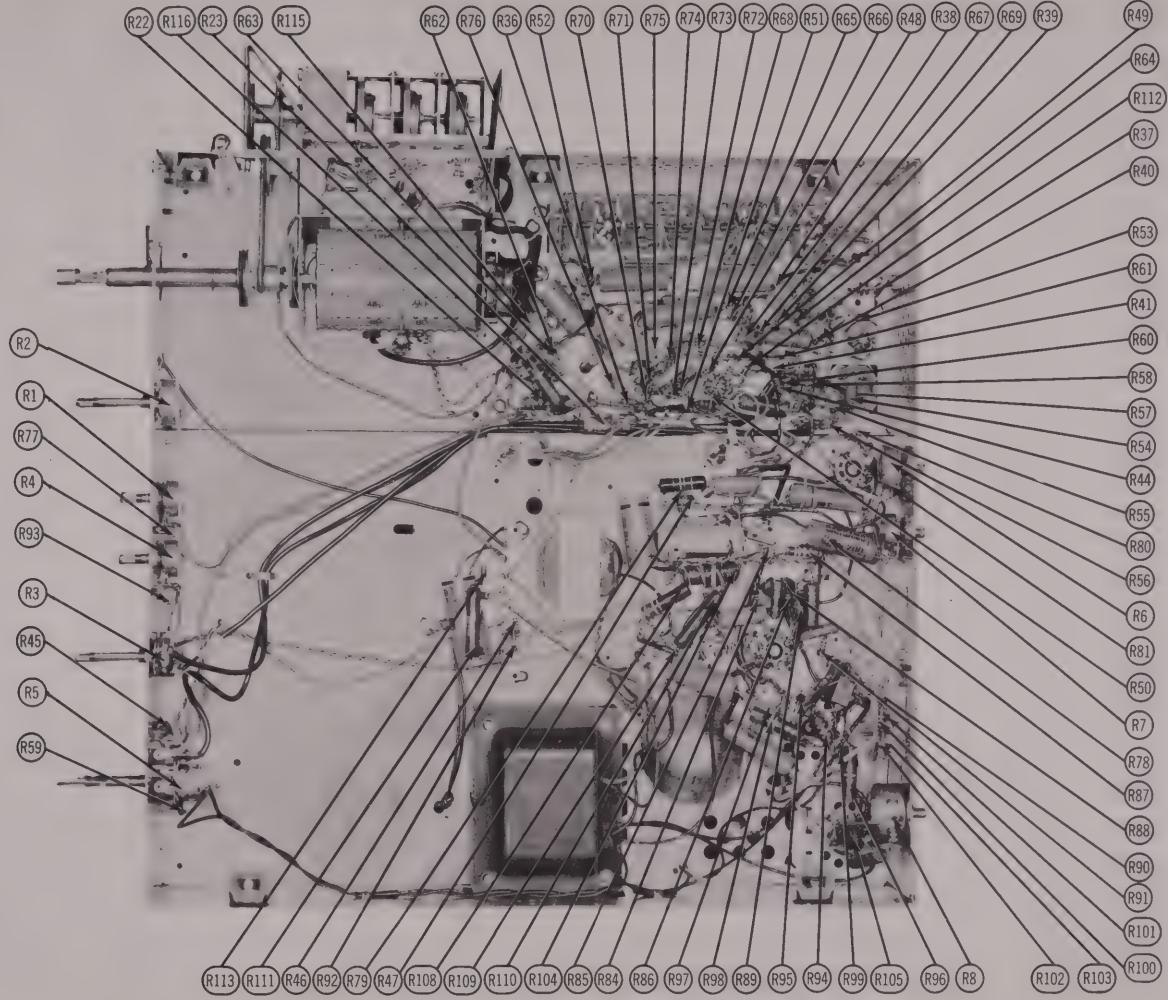
If Satisfactory	If Unsatisfactory
Check ratio detector and audio IF stages for component failure or change of value.	Check C78, C80, C77, R61, T6, speaker and other associated components.

BUZZ

Adjust tuner fine tuning for best sound and picture. Check adjustment A15 for minimum buzz. If still unsatisfactory, check audio IF alignment.

DISTORTED

Follow procedure outlined under "Weak or No Sound".



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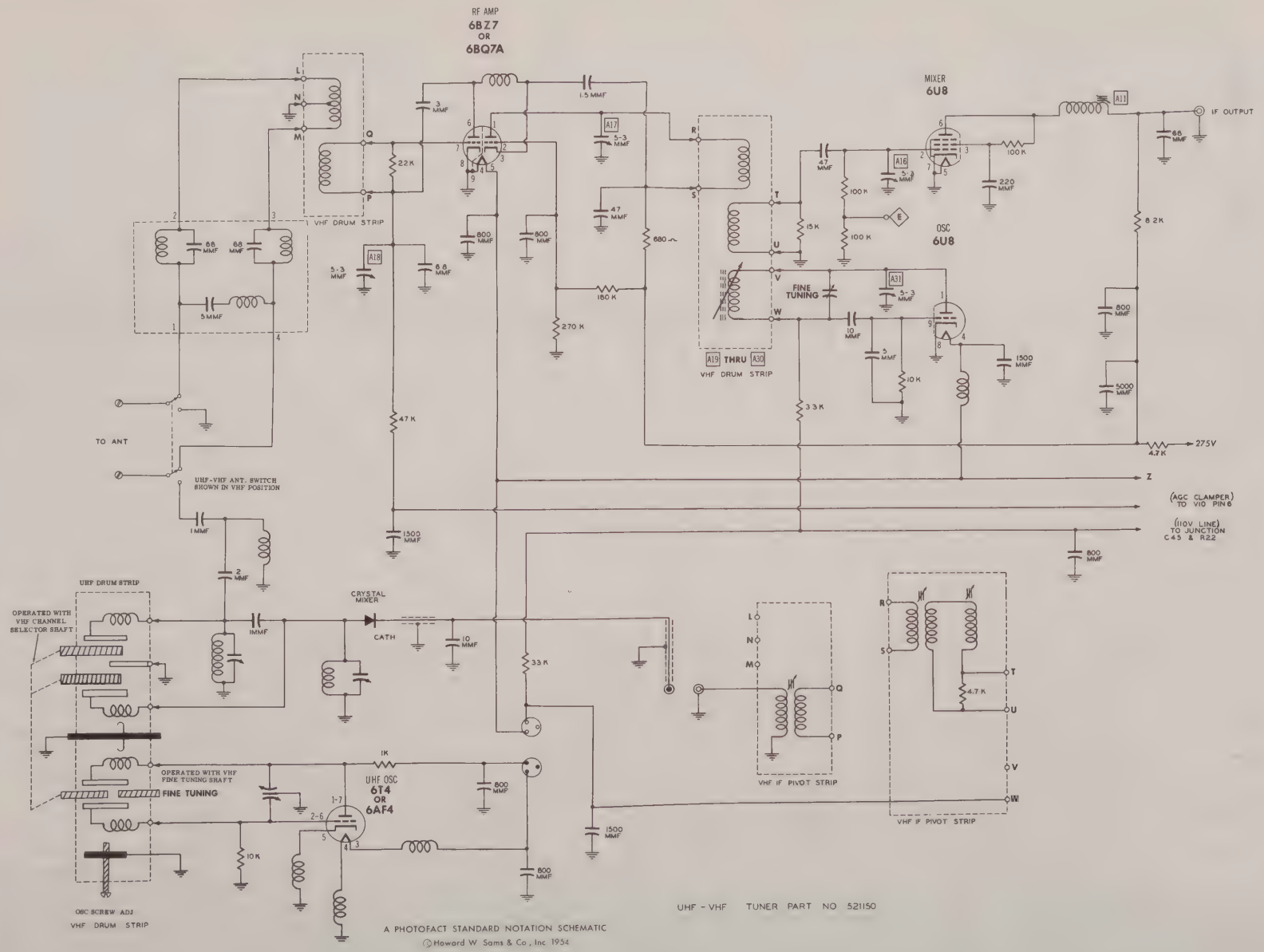
CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION



UHF - VHF TUNER PART NO 521150

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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ALTERNATE TUNER SCHEMATIC

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		SILVERTONE PART No.	STANDARD REPLACEMENT		
V1	UHF Oscillator	6AF4	6AF4	7DK	
V2	VHF RF Amp.	6BQ7A	6BQ7A	9AJ	6BQ7 or 6BZ7 used in some sets.
V3	Mixer-Osc.	6J6	6J6	7BF	
V4	1st Video IF Amp.	6CB6	6CB6	7CM	
V5	2nd Video IF Amp.	6CB6	6CB6	7CM	
V6	3rd Video IF Amp.	6CB6	6CB6	7CM	
V7	Video Output	12BY7	12BY7	9BF	
V8	AGC Keying	6AU6	6AU6	7BK	
V9	Sound IF Amp.	6AU6	6AU6	7BK	
V10	Ratio Detector-AF Amp. -AGC Clamper	6T8	6T8	9E	
V11	Audio Output	6AQ5	6AQ5	7BZ	
V12	Sync Separator	6BE6	6BE6	7CH	
V13	Sync Amplifier-Vert. Osc.	12AU7	12AU7	9A	
V14	Vert. Output	6AH4GT	6AH4GT	8EL	
V14	Horiz. AFC-Horiz. Osc.	6SN7GT	6SN7GT	8BD	
V16	Horiz. Output	6BQ6GT	6BQ6GT	6AM	
V17	Damper	6AX4GT	6AX4GT	4CG	
V18	HV Rectifier	1B3GT	1B3GT	3C	
V19	LV Rectifier	5U4G	5U4G	5T	

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

CATHODE-RAY TUBE

ITEM No.	REPLACEMENT DATA					RETMA BASE TYPE	NOTES
	SILVERTONE PART No.	CBS-HYTRON PART No.	GENERAL ELECTRIC PART No.	SYLVANIA PART No.	WESTINGHOUSE PART No.		
V20	21MP4	21MP4	21MP4	21MP4	21MP4	12M	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT	SILVERTONE PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1A	▲40	450	508072			FP377	TM-T40-450	T-170	
B	▲40	450							
C	■40	450							
C2A	▲80	250	509002			FP229.8	TM-3057	T-720	
B	▲100	50							
C3	40	300	160095			TC78	TD-40-350	FM-4540	
C4	4	450	504719			TC70	TD-4-450	FM-4504	
C5	4	450	504719			TC70	TD-4-450	FM-4504	
C6	10	150	505174			TC42	TD-10-150	FM-1512	
C7	1			TCZ-1	NP0K-010				
C8	1			TCZ-1	NP0K-010				
C9	2.7								
C10	.8-6.5								
C11	.25								
C12	.25								
C13	.8-6.5								
C14	2.5								
C15	2.2			TCZ-2R2	NP0K-2R2				
C16	.68								
C17	[illegible]								
C18	3-10								
C19	68			D6-680	GP1K-680	UC-5468			
C20	68			D6-680	GP1K-680	UC-5468			
C21	[illegible]								
C22	100			D6-101	GP1K-101	UC-531			
C23	3-9		509064	829-10					
C24	800			MFT-1000					
C25	3		513453	TCZ-3R3	NP0K-030	ZT-5533			
C26	800			MFT-1000					
C27	.5-3		509063	829-3	3115-01-0R5	CT565A			
C28	1.5		513033	TCZ-1R5	NP0K-1R5	ZT-5515			
C29	68		513040	D6-680	801-680	UC-5468			
C30	1000		513041	DD-102	801-001	DC-521			
C31	800			MFT-1000					
C32	47		520719	D6-470	801-470	UC-5447			
C33	.5-3		509063	829-3	3115-01-0R5	CT565A			
C34	10		513437	TCZ-10	NP0K-100	ZT-541			
C35	5		513450						
C36	1000		513041	DD-102	801-001	DC-521			
C37	1000		513041	DD-102	801-001	DC-521			
C38	6.8		513451	TCZ-6R8	NP0K-6R8	ZT-5568			
C39	800			MFT-1000					
C40	800			MFT-1000					
C41	1000		513009	DD-102	801-001	DC-521			
C42	110		513452						
C43	5000		513013	DD-502	811-005	DC-525		C-1250	
C44	5000		513013	DD-502	811-005	DC-525		C-1250	
C45	5000		513013	DD-502	811-005	DC-525		C-1250	
C46	8		513455						
C47	1500		513038	D6-152	GP2L-152	UC-5215		C-1215	Note 1
C48	470		513037	D6-471	GP2K-471	UC-5347		K-1347	
C49	1500		513038	D6-152	GP2L-152	UC-5215		C-1215	
C50	470		513037	D6-471	GP2K-471	UC-5347		K-1347	
C51	1500		513038	D6-152	GP2L-152	UC-5215		C-1215	
C52	12		513448						
C53	5		513449						
C54	1500		513038	D6-152	GP2L-152	UC-5215		C-1215	
C55	470		513037	D6-471	GP2K-471	UC-5347		K-1347	
C56	1500		513038	D6-152	GP2L-152	UC-5215		C-1215	
C57	680		513044	D6-681	GP2K-681	UC-5368		K-1368	
C58	1500		513038	D6-152	GP2L-152	UC-5215		C-1215	
C59	1500		513038	D6-152	GP2L-152	UC-5215		C-1215	
C60	4		513454						
C61	5		513432	TCZ-4R7	NP0K-050	ZT-555		KR-1550	
C62	.22	200	512238			PT4022	IMP2-P22	3302022	
C63	47		513438	TCZ-47	NP0K-470	ZT-5447		KR-1447	

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS (cont)

ITEM No.	RATING CAP	RATING VOLT	SILVERTONE PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	NOTES
C64	1	200	512218	DF-104		PT4IL	IMP3-P1	33C201	
C65	.047	200	512235	DF-503		PT4147	IMP3-S47	33G247	
C66	220	1000	513032	DD30-221	IR5KV-221	MCK322		K-2322	
C67	.47	200	512239			PT4147	IMP3-P47	33G247	
C68	2.2		513001	TCS-2.2	NP0K-2R2			C-1250	
C69	5000		513013	DD-502	81L-005	DC-525		C-1250	
C70	5000		513013	DD-502	81L-005	DC-525		C-1250	
C71	1500		513010	D6-153	GP2L-152	UC-5215		C-1215	
C72	1500		513010	D6-152	GP2L-152	UC-5215		C-1215	
C73	5000		513013	DD-502	81L-005	DC-525	IMP5-D5	C-1250	
C74	.047	200	512235	DF-503		PT4147	IMP3-S47	33G247	
C75	5000		513013	DD-502	81L-005	DC-525	IMP5-D5	C-1250	
C76	5000		513013	DD-502	81L-005	DC-525	IMP5-D5	C-1250	
C77	270		512004	D6-271	GP2K-271	UC-5327		K-1327	
C78	01	400	512205	D6-103	GP2-233-103	PT4IL	IMP4-S1	33G41	
C79	.01	200	512204	D6-103	GP2-233-103	PT4IL	IMP4-S1	33G41	
C80	5000		513013	DD-502	81L-005	DC-525	IMP5-D5	C-1250	
C81	5000		513013	DD-502	81L-005	DC-525	IMP5-D5	C-1250	
C82	.047	200	512235	DF-503		PT4147	IMP3-S47	33G247	
C83	.47	200	512239			PT4147	IMP3-P47	33G247	
C84	.01	400	512205	D6-103	GP2-233-103	PT4IL	IMP4-S1	33G41	
C85A	.01					PT4IL	IMP6-S1	33G41	
B	.002		*508062	DD-103	81L-01	PT622	IMP6-D2	C-1220	
C	.005			PC-100	1405-01	PT625	IMP6-D5	C-1250	
D	.005					PT625	IMP6-D5	C-1250	
C86	4700	1000	512533						
C87	.047	400	512236	DF-508		PT4147	IMP4-S47	33G147	
C88	.033	200	512210			PT4133	IMP6-S3	33G133	
C89	1	200	512216	DF-104		PT4IL	IMP6-P1	33G101	Note 2
C90	.1	600	512218	DF-104		PT4IL	IMP6-P1	33G101	
C91	100	500	512502			MCB235		KR-1310	
C92	.0022	600	512232	D6-222	GP2-233-222	CUB4D22	IMP6-D22	33G222	
C93	47	1000	513030	DD30-470	IR5KV-470	MCL447		K-1447	
C94	47	1000	513030	DD30-470	IR5KV-470	MCL447		K-1447	
C95	.047	200	512235	DF-503		PT4147	IMP3-S47	33G147	
C96	.047	200	512235	DF-503		PT4147	IMP3-S47	33G147	
C97	.022	400	512233	DF-303	81T-Q2	PT4122	IMP4-S22	33G422	
C98	47	200	512239			PT4047	IMP3-P47	33G347	
C99	200		513427						
C100	.01	200	512311						
C101	820	500	512547					KR-1302	
C102	1000		512009	D6-102	GP2L-102	UC-521	IMP6-D1	C-1210	
C103	270		513006	D6-271	GP2K-271	UC-5327		K-1327	
C104	.1	600	512218	DF-104		PT101	IMP6-P1	33G101	
C105	.22	200	512238			PT4122	IMP3-P22	33G322	
C106	100	500	512502			MCB235		KR-1310	
C107	.22	200	512235	DF-503		PT4147	IMP3-S47	33G147	
C108	.047	600	512237			PT6147	IMP6-S47	33G647	
C109	.022	600	512234			PT6122	IMP6-S22	33G622	
C110	500	12000	529998	TV3-503	413	HV2003A			
C111	56	1500	513027	DD30-560	3KV-560			K-4456	
C112	5000		513013	DD-502	81L-005	DC-525		C-1250	
C113	680		513044	D6-681	GP2K-681	UC-5288		K-1288	Note 3
C114	.22	200	512238			PT4122	IMP3-P22	33G322	Note 2
C115	47		513002	TCS-47	NP0K-470	PT-5447		KR-1647	Note 3

Note 1: Some versions may use 3000MMF in this application.
Note 2. Not used in some versions.
Note 3 :Not used in some versions. Some models may use 82MMf or 470MMF.
* Items# C85A, C85B, C85C, C85D, R75A, R75B & R75C are combined in one unit.
* To replace mfgr's. original unit, install 10000MMF unit in series with C-R unit input lead.

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	SILVERTONE PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	100KΩ		531080	* QJ-671	RTY-628	P1-31	UP15L	Brightness-Panel
B	1 Meg					R2-57	UR15T25 †	Volume tapped @ 200K-Rear
C	Switch					US-38	US-38	Attach to R1B
R2A	500KΩ		530746	QU-133	A47-500K-S	AB-58	U-50	Tone
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R2A
R3A	50KΩ		521059	QU-123	A47-50K-S	AB-31	U-35	Horiz. Hold
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R3A
R4A	1 Meg		532058	QU-137	A47-1Meg-S	AB-59	U-54	Vert. Hold
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R4A
R5A	500KΩ		521057	QU-103	A47-500K-S	AB-4	R500L	Picture
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	D6-36	Attach to R5A
R6A	5000Ω		532045	QU7-114	A47-5000-S	AB-12	SU-14	Vert. Linearity
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Not Req.	Attach to R6A
R7A	2.5Meg		529044	QU-139	A47-2.5Meg	AB-63	SU-565	Vert. Size
B	Shaft		Not Req.	Not Req.	-@			
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Not Req.	Attach to R7A
R8A	400Ω	4	532096	4WE-400	A10-400	5VP-981	M400PE	Width-vtr wound
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Not Req.	Attach to R8A

* CONCENTRIKIT EQUIVALENT KIT K-2 BASE ELEMENTS & SHAFTS B11-128 & P1-123 (Panel)
B13-1373 & R1-216 (Rear) & SWITCH 76-L
† Universal replacement (Mallory exact duplicate Part No. UE12405)

RESISTORS

ITEM No.	RATING OHMS	RATING WATT	SILVERTONE PART No.	IRC PART No.	NOTES
R9	470KΩ			BTS-470K	
R10	470KΩ			BTS-470K	
R11	12KΩ			BTS-12K	
R12	15KΩ			BTS-15K	
R13	47KΩ			BTS-47K	
R14	330KΩ			BTS-330K	
R15	220KΩ			BTS-220K	
R16	470Ω			BTS-47	
R17	15KΩ			BTS-15K	
R18	220KΩ			BTS-220K	
R19	15KΩ			BTS-15K	
R20	10KΩ			BTS-10K	
R21	470Ω			BTS-470	
R22	100Ω		510118	BTS-100	
R23	4700Ω		510346	BTA-4700	
R24	6800Ω		510151	BTS-6800	
R25	47Ω		510112	BTS-47	
R26	6800Ω		510151	BTS-6800	

RESISTORS (cont)

ITEM No.	RATING OHMS	RATING WATT	SILVERTONE PART No.	IRC PART No.	NOTES
R27	1200Ω		510138	BTS-1200	
R28	248Ω ½%		510723	BTS-24K 5%	
R29	100KΩ		510173	BTS-100K	
R30	120KΩ		510174	BTS-120K	
R31	6800Ω		510151	BTS-6800	
R32	47Ω		510113	BTS-47	
R33	4700		510130	BTS-470	
R34	8200Ω		510153	BTS-8200	
R35	82Ω		510117	BTS-82	
R36	4700		510130	BTS-470	
R37	5600Ω		510150	BTS-5600	
R38	470Ω		510168	BTS-470K	
R39	8200Ω		510153	BTS-8200	
R40	15KΩ		510744	BTS-15K	Note 1
R41	3900Ω		510247		Note 2
R42	330KΩ		510181	BTS-330K	Note 3
R43	560KΩ		510186	BTS-560K	Note 3
R44	100KΩ		510173	BTS-100K	
R45	22KΩ		510181	BTS-22K	Note 3
R46	330KΩ		510181	BTS-330K	Note 3
R47	100KΩ		510173	BTS-100K	Note 3
R48	1500Ω		510139	BTS-1500	Note 6
R49	33KΩ		510183	BTS-33K	
R50	100KΩ		510177	BTS-100K	
R51	1.3Meg		510701	BTS-1.3Meg	Note 8
R52	100KΩ		510173	BTS-100K	Note 4
R53	82Ω		510117	BTS-82	Note 10
R54	4700Ω		510249	BTA-4700	Note 5
R55	220Ω		510134	BTS-220	
R56	18KΩ		510159	BTS-18K	
R57	220Ω		510134	BTS-220	
R58	22KΩ		510180	BTS-22K	
R59	68KΩ		510169	BTS-68K	
R60	10 Meg		510197	BTS-10 Meg	
R61	470KΩ		510184	BTS-470K	
R62	560KΩ ½%		510778	BTS-560K ½%	
R63	820KΩ ½%		510747	BTS-820K ½%	
R64	18KΩ		510159	BTS-18K	
R65	2.2Meg		510163	BTS-2.2Meg	
R66	1.5 Meg 5%		510752	BTS-1.5Meg 5%	Note 11
R67	82KΩ		510171	BTS-82K	
R68	22KΩ		510180	BTS-22K	
R69	220KΩ		510178	BTS-220K	
R70	10 Meg		510197	BTS-10 Meg	
R71	22KΩ		510180	BTS-22K	
R72	4700Ω		510248	BTS-4700	
R73	4700Ω		510248	BTS-4700	Note 7
R74	18KΩ		510159	BTS-18K	
R75A	22KΩ			BTS-22K	
B	8200Ω		* 508063	BTS 8200	
C	12000Ω			BTS-8200	
R76	1.2Meg 5%		510777	BTS-1.2Meg 5%	
R77	220KΩ		510178	BTS-220K	
R78	470KΩ		510184	BTS-470K	
R79	8200Ω		510153	BTS-8200	
R80	2.2Meg		510193	BTS-2.2Meg	
R81	39KΩ		510329	BTS 390	
R82	56KΩ		510132	BTS-560	
R83	56KΩ		510132	BTS 560	
R84	330KΩ		510181	BTS-330K	
R85	820KΩ		510189	BTS-820K	
R86	100KΩ		510172	BTS-100K	
R87	330KΩ		510181	BTA-330K	
R88	4700Ω		510248	BTA-4700	
R89	150KΩ		510175	BTS-150K	
R90	220KΩ		510178	BTS-220K	
R91	10KΩ		510154	BTS-10K	
R92	68KΩ		510169	BTS-68K	
R93	120KΩ		510174	BTS-120K	
R94	68KΩ		510169	BTS-68K	
R95	470KΩ		510184	BTS-470K	
R96	100Ω		510318		
R97	47KΩ		510188	BTS-47K	
R98	1KΩ		510356	BTS-1K	
R99	150KΩ		510175	BTS-150K	
R100	150KΩ		510175	BTS 150K	
R101	1 Meg		510190	BTS-1 Meg	
R102	56KΩ		510168	BTS-56K	
R103	1 Meg		510190	BTS-1 Meg	
R104	330KΩ		510181	BTS-330K	
R105	680Ω		510134	BTS 680	
R106	3.3Ω		510725		
R107	1 Meg	1	510190	BTA-1 Meg	
R108	15KΩ	2	510357	BTH-15K	
R109	150KΩ	1	510175	BTS-150K	
R110	400Ω	10	510779	1 3/4A-400	
R111	600Ω	10	510741	1 3/4A-600	
R112	100KΩ	1	510172	BTS-100K	
R113	10Ω	1	510101	BTS-10	
R114	150KΩ	1	510175	BTS-150K	
R115	4700Ω	2	510348	BTB-4700	
R116	2700Ω	2	510344	BTB-2700	
R117	330KΩ	1		BTS-330K	Note 3
R118	100KΩ			BTS-100K	Note 3
R119	6800Ω	1		BTS-6800	Note 3

* Items R75A, R75B, R75C, C85A, C85B, C85C & C85D are combined in one unit.
Note 1: Some versions may use a 12KΩ resistor in this application.
Note 2: Some versions may use a 2200Ω resistor in this application.
Note 3: Not used in some versions.
Note 4: Some versions may use a 220KΩ resistor in this application.
Note 5: Some versions may use a 47KΩ resistor in this application.
Note 6: Some versions may use a 1800Ω resistor in this application.
Note 7: Some versions may use a 6800Ω resistor in this application.
Note 8: Some versions may use a 10Meg resistor in this application.
Note 9: Some versions may use a 1000Ω resistor in this application.
Note 10: Some versions may use a 120Ω resistor in this application.
Note 11: Some versions may use a 2. 7Meg resistor in this application.

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	SILVERTONE PART No.	Halldorson PART No.	Merit PART No.	RCA TYPE No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117VAC @ 1.73A	660VCT @ 170ADC	5VAC @ 3A	530951						
		SEC. 3	SEC. 4	SEC. 5						
		6.3VAC @ 3.1A	12.6VCT @ 3.5A							

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No.	USE	SILVERTONE PART No.	Halldorson PART No.	Merit PART No.	RCA PART No.	Ram PART No.	Stancor TYPE No.	Thordarson PART No.	Triad PART No.
T2	Vert. Osc. Trans.	W530980	B6702	A-3003	209T1 ⊥	V405	A-8125	26A03	A-97X
T3	Horiz. Output Trans.	W521066	F84U1* ⊥	HV0-9* ⊥	232T1* ⊥	X080* ⊥	A-8252* ⊥	FLY-24*⊥	D-35* ⊥
T4	Vert. Output Trans.	W520975 ②	21804 ⊥	A-3037 ⊥	222T1 ⊥	V313 ⊥	A-8233 ⊥	26S3 ⊥	A-102X ⊥
T5	Yoke-Horiz.(13.5MH)	W520942 ③	DF603 ⑤	MDF-72 ⑤	21LD2 ⑤	④	H70P14/43 ⑤	DY-9A ⑤	Y-17-1 ⑤
B	Vert.(37MH)	W521267 ⑥	B						

① Drill new mounting hole(s).
② Includes connectors for deflection yoke leads.
③ Includes leads, connectors and resistors R82 & R83.
④ Yoke rear cover & centering device.
⑤ Use original rear cover & centering device.
⑥ Connect horiz. damping network across Terms #3 & #7. Use original network, if necessary.
⑦ Remove capacitor from terms #1 & #2.

*HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA

Use Original Width Coil Unless Replacement Type Is Listed

	ORIGINAL TERMINAL CONNECTIONS	Halldorson Replacement Connections	Merit Replacement Connections	RCA Replacement Connections	Ram Replacement Connections	Stancor Replacement Connections	Thordarson Replacement Connections	Triad Replacement Connections
	6	Hi-Volt Rect. Plate Lead	Hi-Volt Rect. Plate Lead	Hi-Volt Rect. Plate Lead	Hi-Volt Rect. Plate Lead	Hi-Volt Rect. Plate Lead	Hi-Volt Rect. Plate Lead	Hi-Volt Rect. Plate Lead
	7	9	9	10	9	9	9	10
	8	7 or 8	7 or 8	8	Jumper 7 & 8	Jumper 7 & 8	7 or 8	8
	5	5	5	6	5 or 4	5	5	6
	3	4	4	5	7	4	4	5
	2	3	3	2 & 3	2 & 3	3	3	2 & 3
	1	1	1	1	1	1	1	1
Special Notes		①	②		③		②	②

① If insufficient width, add capacitance across terms "1" & #3. Values required may range from .001MFD, 600V to .003MFD, 800V.
② Jumper terms #9 & "7".

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	SILVERTONE PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T6	4.3KΩ	3.3Ω	509596	21001	A-2320	A-3877	H-44	S-3X	

SPEAKER

ITEM No.	RATINGS SIZE	RATINGS FIELD	RATINGS V. C. IMP.	SILVERTONE PART No.	QUAM PART No.	NOTES
SP1	10"	PM	3.2Ω	508664 ①	10A3	① Used in models 3181, 3185
	6"	PM	3.2Ω	509398 ②	6A1	② Used in model 3136.

COILS (RF-IF)

ITEM No.	USE	DC RES PRI.	DC RES SEC.	SILVERTONE PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1	UHF Ant. Coil	0Ω						
L2	UHF Ant. Coil - Ind. Inductor	0Ω						
L3	UHF Mixer Coil	0Ω						
L4	UHF Mixer Coil - Ind. Inductor	0Ω						
L5	UHF Osc. Coil	0Ω						
L6	UHF Osc. Coil - Ind. Inductor	0Ω						
L7	UHF Cathode Choke	0Ω						
L8	UHF HF Choke	1Ω						
L9	UHF Fil. Choke	1Ω						
L10	UHF RF Choke	0Ω						
L11	UHF RF Coupling	0Ω						
L12	UHF IF Output Coil	0Ω	0Ω					
L13	UHF IF Coupling Coil	0Ω		521821				UHF IF Strip
B	VHF Ant. Coil	0Ω		521822				Channel 2
C	VHF Ant. Coil	0Ω		521823				Channel 3
D	VHF Ant. Coil	0Ω		521824				Channel 4
E	VHF Ant. Coil	0Ω		521825				Channel 5
F	VHF Ant. Coil	0Ω		521826				Channel 6
G	VHF Ant. Coil	0Ω		521827				Channel 7
H	VHF Ant. Coil	0Ω		521828				Channel 8
I	VHF Ant. Coil	0Ω		521829				Channel 9
J	VHF Ant. Coil	0Ω		521830				Channel 10
K	VHF Ant. Coil	0Ω		521831				Channel 11
L	VHF Ant. Coil	0Ω		521832				Channel 12
M	VHF Ant. Coil	0Ω		521833				Channel 13
L14	VHF Fil. Choke	0Ω		520518				
L15	VHF Neut. Coil	0Ω		520701				
L16	UHF I.F Coupling Coil	0Ω		521841				UHF IF Strip
B	VHF RF Mixer Grid, Osc. Coil	0Ω		521842				Channel 2
C	VHF RF Mixer Grid, Osc. Coil	0Ω		521843				Channel 3
D	VHF RF Mixer Grid, Osc. Coil	0Ω		521844				Channel 4
E	VHF RF Mixer Grid Osc. Coil	0Ω		521845				Channel 5
F	VHF RF Mixer Grid, Osc. Coil	0Ω		521846				Channel 6
G	VHF RF Mixer Grid, Osc. Coil	0Ω		521847				Channel 7
H	VHF RF Mixer Grid, Osc. Coil	0Ω		521848				Channel 8
I	VHF RF Mixer Grid, Osc. Coil	0Ω		521849				Channel 9
J	VHF RF Mixer Grid, Osc. Coil	0Ω		521850				Channel 10
K	VHF RF Mixer Grid, Osc. Coil	0Ω		521851				Channel 11
L	VHF RF Mixer Grid, Osc. Coil	0Ω	521852	521852				Channel 12
M	VHF RF Mixer Grid, Osc. Coil	0Ω		521853				Channel 13

SILVERTONE MODELS 3136, 3181, 3185 (Ch. 100.425-2, -4, -6, -8)

PARTS LIST AND DESCRIPTIONS (Continued)

COILS (cont)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	SILVERTONE PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L17	VHF Fil.Choke	0Ω		520520				
L18	VHF RF Coil	1.3Ω		521834				
L19	VHF RF Choke	0Ω		521835				
L20	VHF Converter Plate	0Ω		521836				
L21	1st Video IF Grid	1.3Ω						Includes 39.75MC trap
L22	1st Video IF Plate	1.8Ω						
L23	41.25MC Trap & 47.75MC Trap	1.5Ω 1.1Ω						
L24	2nd Video IF Grid	.8Ω						
L25	3rd Video IF	1.9Ω	1.3Ω					
L26	4th Video IF	1.6Ω	1.5Ω					
L27	Series Peaking Coil	13Ω		520620	19-3180	TV-184	6180	180 Microhenries
L28	Shunt Peaking Coil	20Ω		520985	19-3660		4650	650 Microhenries
L29	Series Peaking Coil	1.4Ω		522020	19-1004		4610	8 Microhenries
L30	4.5MC Trap	1.6Ω		509603	20-1004	TV-151	1470	
L31	Series Peaking Coil	7Ω		520984	19-3160	TV-184	4644	160 Microhenries; Wound on 15KΩ resistor
L32	Shunt Peaking Coil	22Ω		520986	19-3660		4650	660 Microhenries
L33	Sound IF	1.3Ω		509378	16-3445*	TV-113*	1470-A	
L34	Ratio Detector	3.8Ω	.7ΩCT	509706	17-3493	TV-115■	1498	Tertiary winding=.45Ω
L35	Horiz. Osc.	80Ω		520943	20-1402	TV-162	6183	Slug Core #521064 Waveform winding-45Ω

* Use one winding only.
■ Use adaptor plate.

FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA					
	TOTAL DIRECT CURRENT	D.C. RESISTANCE	INDUCTANCE (0 CURRENT 1000 ~)	SILVERTONE PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
L36	.170A	73Ω	2.9HY	508341	C5030	C-2991 ①	C-2325	26C44	C-17X

① Drill one new mounting hole.

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			SILVERTONE PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1	3AG S/B	4A 125V	521803	520989*	313004 (4A-3AG-S/B)	357002*	MDX4	4408*
M2	3AG	1/4A 250V	508713		312.250 (1/4A-3AG)		AGC 1/4	

* Holder for M2 also (2 pole fuse holder).

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA			NOTES
		SILVERTONE PART No.	SYLVANIA PART No.		
M3	1N72	521819	1N82 or 1N82A		UHF Mixer
M4	1N64	509386	1N60 or 1N132		Video Det.

MISCELLANEOUS

ITEM No.	PART NAME	SILVERTONE PART No.	NOTES
M5	Dial Light	118921	#47, Bayonet
M6	Tuner	521187	VHF
M7	Tuner	521170	UHF
	Tuner	521150	VHF-UHF (Used in some versions)
M8	Switch	521188	VHF-UHF Selector
M9	Centering Magnet	521267	Part of yoke cover (T5)
M10	Ion Trap	521183	
M11	IF Printed Circuit	521816	
	IF Printed Circuit	522088	Alternate
B3	Trimmer Cap.	508071	Horiz. Drive (10-160MMF)
	Cabinet	521581	Model 3136
	Cabinet	521260-A	Model 3181
	Cabinet	521240-A	Model 3185
	Knob	521213	Channel Selector (Green) Wide Ribs
	Knob	521214	Off-On-Volume (Green) Wide Ribs
	Knob	521216	Picture (Beige) Wide Ribs
	Knob	521814	Picture (Beige) Narrow Ribs
	Knob	521215	Fine Tuning (Beige) Wide Ribs
	Knob	521813	Fine Tuning (Beige) Narrow Ribs

PROPERTY OF
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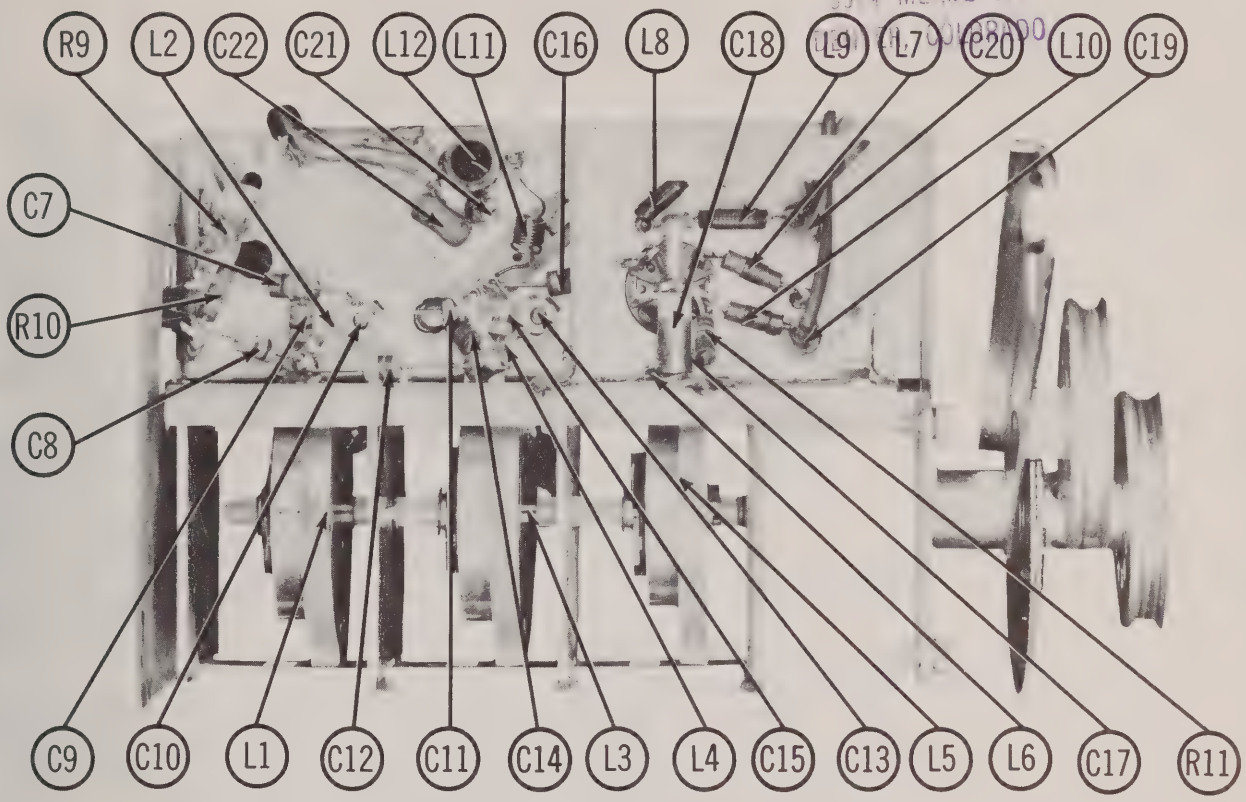
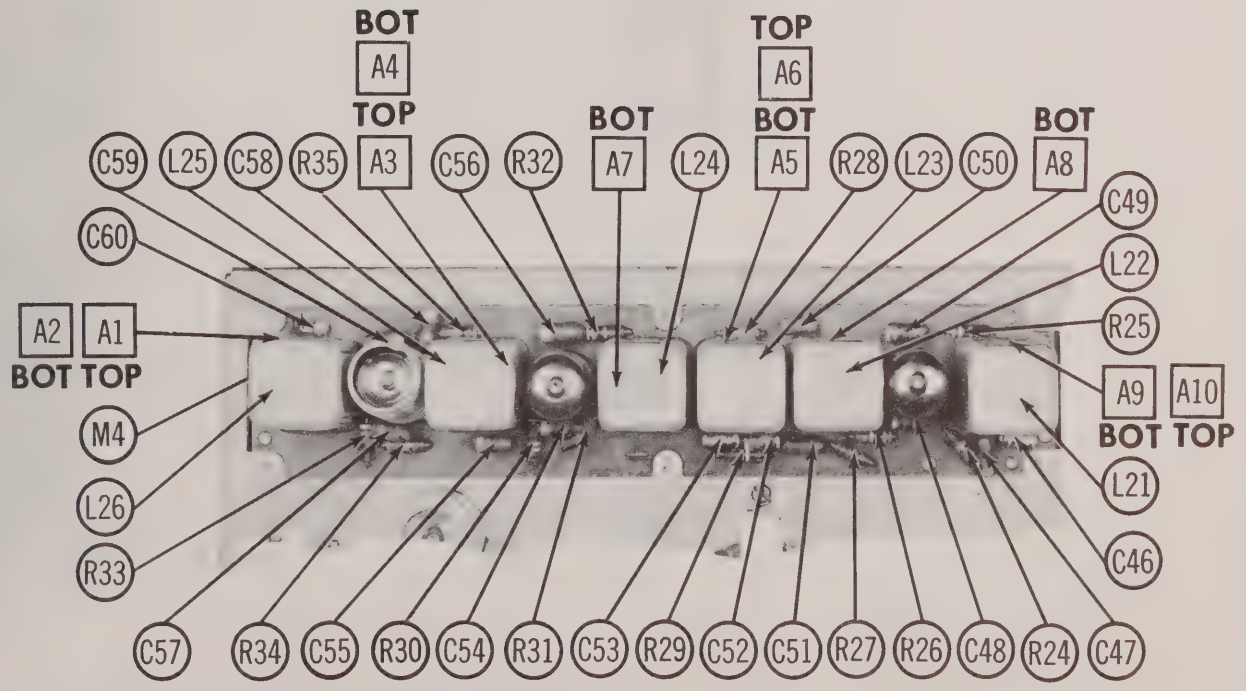
3014 MEADE ST.
[illegible]



UHF TUNER – BOTTOM VIEW



VIDEO IF STRIP

TROUBLE SHOOTING AIDS (cont)

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

POWER

DEAD SET

If filaments fail to light, check AC interlock assembly. Check switch on volume control and T1. Check M1 fuse. If filaments light, substitute V19. Check B+ filter and decoupling network for component failure or change of value.

SMALL AND/OR DIM PICTURE

Substitute V19. Check B+ filter and decoupling network.

HIGH VOLTAGE

LOSS OF HIGH VOLTAGE

Check by substitution V15, V16, V17 and V18. Check M2 fuse. Check waveform W16.

If Satisfactory	If Unsatisfactory
Check T3, T5A, C108, C109, C104, C105, R97, R98, R96, R8 and other associated components.	Check L35, C102, C100, C99, C95, R94, R92, R3 and other associated components.

INSUFFICIENT HIGH VOLTAGE

Check by substitution V15, V16, V17, V18 and V19. Check R8 and B3 for proper adjustment. Check R97, R98, T3, T5A and other associated components.

BLOOMING

Check by substitution V16, V17, V18 and V19. Check R97, R98, R107 and other associated components.

GENERAL

RASTER, SOUND, NO PICTURE

Follow procedure outlined under "Loss of Video ".

RASTER, PICTURE, NO SOUND

Follow procedure outlined under "Weak or No Sound".

RASTER, NO SOUND, NO PICTURE (VHF)

Check by substitution V2, V3, V4, V5, V6, V7, V8 and V11. Check components in video IF stages.

RASTER, NO SOUND, NO PICTURE (UHF)

Substitute V1.

NO RASTER, NO SOUND

Follow procedure outlined under "Dead Set".

KEYSTONE EFFECT

Check T5 and its associated components.

INTERMITTENT STREAKS

Check high voltage section for corona discharge and arcing.

Symptoms shown are assumed and are not indicative of the quality and workmanship of this equipment.

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustments of the VHF Tuner Oscillator Circuit may be accomplished by removal of the Channel Selector and Fine Tuning knobs. The adjustments are accessible, one at a time, through the small hole in the cabinet to the right of the Channel Selector shaft.

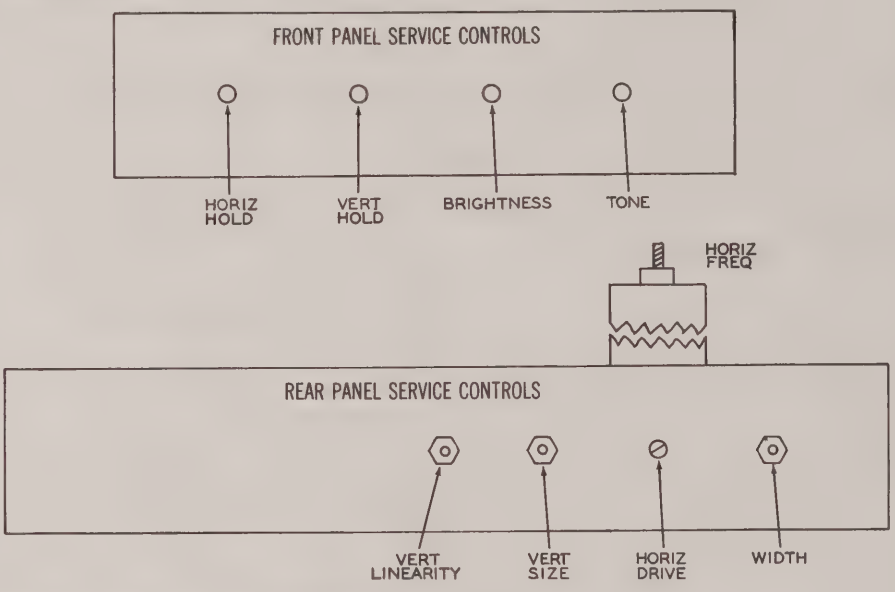
PICTURE TUBE SAFETY GLASS CLEANING

To clean safety glass, remove 6 wood screws holding metal bezel. Remove bezel and safety glass. Use extreme caution when removing safety glass.

PICTURE TUBE REMOVAL

For removal of picture tube, remove safety glass, rear cover and ion trap. Disconnect CRT socket and HV lead. Remove 2 nuts on front of tube mounting. Remove picture tube.

SERVICE ADJUSTMENT LOCATION



HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

For adjustment of the Horiz. Oscillator, it is necessary to remove the rear cover and supply power to set. Adjustment is located on top of chassis. Set the Horiz. Hold Control at the center of its range and adjust the Horiz. Freq. slug (L35) until picture synchronizes horizontally. (For location see tube placement chart.)

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate Sound IF Detector Buzz, adjust the Ratio Detector Secondary (L34) located on top of chassis. (See tube placement chart.)

FUSES

Two fuses are used. One for Horiz. Sweep Circuit protection and one for L. V. power supply protection. (For location, see tube placement chart.)

CENTERING

Centering is accomplished mechanically by adjusting two magnetic rings around the neck of the picture tube, located flush against the deflection yoke. Rotate the two rings around the neck of the tube until the picture is properly centered.

DISASSEMBLY INSTRUCTIONS

1. Remove 7 push-on type control knobs from front panel.
2. Remove 7 wood screws and 1 metal screw. Remove rear cover.
3. Disconnect speaker leads and built-in antenna.
4. Disconnect 5 chassis bolts. Remove chassis.

PROPERTY OF
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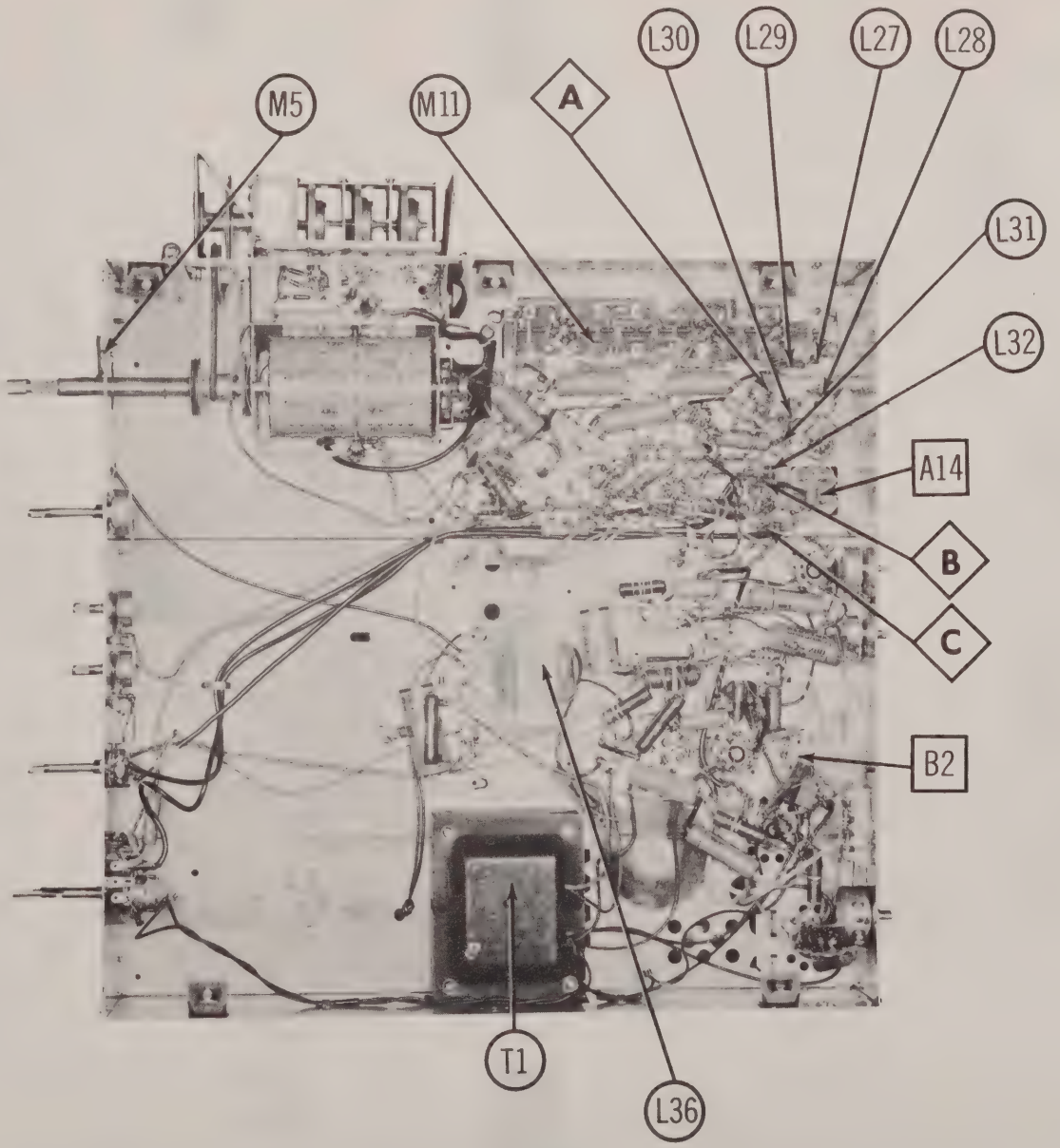
DENVER, COLORADO

TUNING GANG FULLY CLOCKWISE.

DRIVE CORD STRINGING



CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENTIFICATION

SILVERTONE MODELS 3247, 4247, 42471 (Ch. 548.400, -1)

FR
L. F. D
3924 MEADE ST.
DENVER, COLORADO

SILVERTONE MODELS 3247, 4247, 42471 (Ch. 548.400, -1)

SILVERTONE MODELS 3247, 4247, 42471 (Ch. 548.400, -1)

TRADE NAME	Silvertone Models 3247, 4247, 42471 (Ch. 548.400, -1)
SUPPLIER	Sears Roebuck & Co., 925 S. Homan, Chicago, Ill.
TYPE SET	AC Operated Phono Amplifier With 3 Speed Automatic Record Changer
TUBES (Four)	Types 12AX7 AF Amp.-Phase Inv., (2) 35L6GT Output, 35Z5GT Rectifier
POWER SUPPLY	110-120 Volts AC-60 Cycles RATING .28 Amp. @ 117 Volts AC

FOR SERVICE INFORMATION ON RECORD CHANGER UNIT 488.216-10 SEE SIMILAR V-M MODEL 950 — PHOTOFACT SET 216 — FOLDER 11 OR RECORD CHANGER MANUAL CM-5.

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

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PARTS LIST AND DESCRIPTIONS

SILVERTONE
MODEL 3247 (Ch. 548.400, -1)

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA: Silvertone PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RETMA BASE TYPE	NOTES
V1	AF Amp.-Phase Inverter	12AX7	12AX7	9A	
V2	Output	35L6GT	35L6GT	7AC	
V3	Output	35L6GT	35L6GT	7AC	
V4	Rectifier	35Z5GT	35Z5GT	6AD	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA: Silvertone PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1A	40	150	1010-A			FP311.5	TM-4061	FMT-1540	Red
B	40	150						FM-0225	Red
C	20	150							Yellow
D	20	25							Blue -Note 1
C2	330		809-B	D6-331	GP2K-331	UC-5333			
C3	.1	200	804	DF-104		PT401	IMP2-P1	330201	
C4	.1	200	804	DF-104		PT401	IMP2-P1	330201	
C5	.1	200	804	DF-104		PT401	IMP2-P1	330201	
C6	.1	200	804	DF-104		PT401	IMP2-P1	330201	
C7	.1	200	804	DF-104		PT401	IMP2-P1	330201	
C8	.05	400	828	DF-503		4TM-S5	IMP4-S5	330415	

Note 1. C1D is not used.

CONTROLS

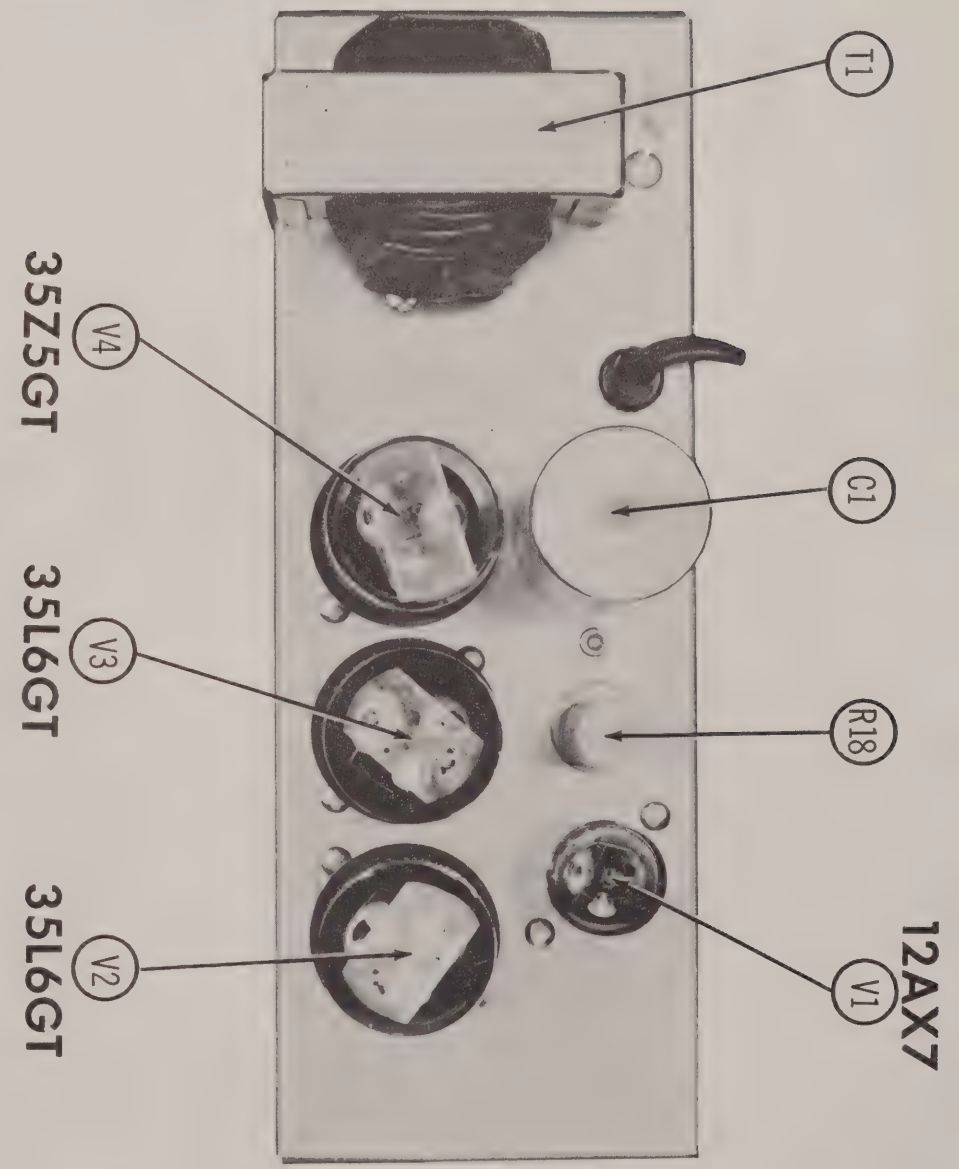
ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA: Silvertone PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	7500Ω	½	408G	Q13-116	A47-10K-Z	AB-15	U-18	Tone
B	Shaft		Not Req.	Not Req.	KES-3	AK-4	Not Req.	Attach to R1A
R2A	3Meg	½	401E			ABT-8515	UT-457	Volume-tapped @ 300KΩ
B	Shaft		Not Req.			AK-4	Not Req.	Attach to R2A

RESISTORS

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA: Silvertone PART No.	IRC PART No.	NOTES
R3	270KΩ	½		BTS-270K	Note 1
R4	22KΩ	½	517	BTS-22K	
R5	4500Ω	½	519	BTS-4500	
R6	250KΩ	½		BTS-250K	
R7	50KΩ	½		BTS-50K	Note 2
R8	10KΩ	½	522	BTS-10K	
R9	250KΩ	½		BTS-250K	
R10	500KΩ	½		BTS-500K	Note 3
R11	75Ω	2	628		
R12	500KΩ	½		BTS-500K	Note 3
R13	10KΩ	½	522	BTS-10K	Note 4
R14	10KΩ	½	522	BTS-10K	
R15	100Ω	2	630		
R16	22Ω	1	629		
R17	56Ω	2	627		
R18	600Ω	10	626		

Note 1. Some versions may use a 250KΩ in this application.
Note 2. Some versions may use a 47KΩ in this application.
Note 3. Some versions may use a 470KΩ in this application.
Note 4. Some versions may use a 5KΩ in this application.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	Silvertone PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	
T1	4.8KΩ CT	1.6Ω	1208	A-3830	A-2902 ①	S-57Z	Z1011	24S61 ①	① Drill one new mounting hole.

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA			NOTES
	SIZE	FIELD	V. C. IMP.	Silvertone PART No.	JENSEN PART No.	QUAM PART No.	
SP1	6"	PM	3.2Ω	2615	ST-108 Mod. P6-X	6A1	① Model 3247 uses three (3) 5 1/4" speakers in parallel
SP2	6"	PM	3.2Ω	2615	ST-108 Mod. P6-X	6A1	
	5 1/4"	PM	3.2Ω	2614 ①	ST-803 Mod. P525-V	52A1	

PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA					REMARKS
	Silvertone PART No.	ASTATIC PART No.		ELECTRO-VOICE PART No.		
		CARTRIDGE	NEEDLE	CARTRIDGE	NEEDLE	
M1	2564			47	0-1 or S-1 & 0-3	

ELECTRO-VOICE NEEDLE LISTINGS SHOWN ABOVE ARE SPECIFIED FOR THEIR RESPECTIVE REPLACEMENT CARTRIDGE LISTED. FOR ORIGINAL CARTRIDGE NEEDLE REPLACEMENT SEE BELOW.

PHONO NEEDLE

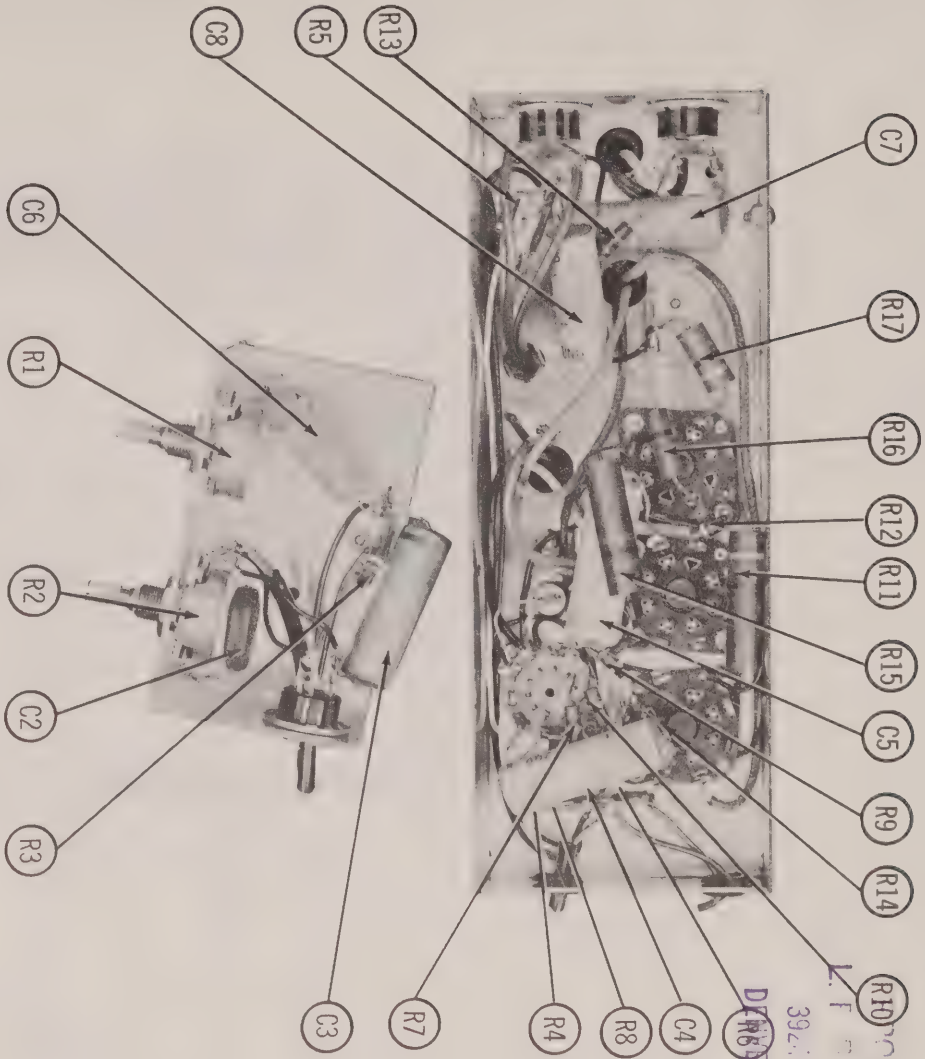
(FOR REPLACEMENT IN ORIGINAL EQUIPMENT CARTRIDGE)

ITEM No.	REPLACEMENT DATA				REMARKS
	Silvertone PART No.	JENSEN PART No.	PERMO PART No.	WALCO PART No.	
M2	2564-A	†S-66 or ♦†S-66SD or ♦S-66D or *S-67	†AC-434 or ♦†AC-434D1 or †♦AC-434D2 or ♦AC-434D	†W-75TPS or ♦†W-75DS or ♦W-75TPD	* Metal † Jewel ♦ Diamond

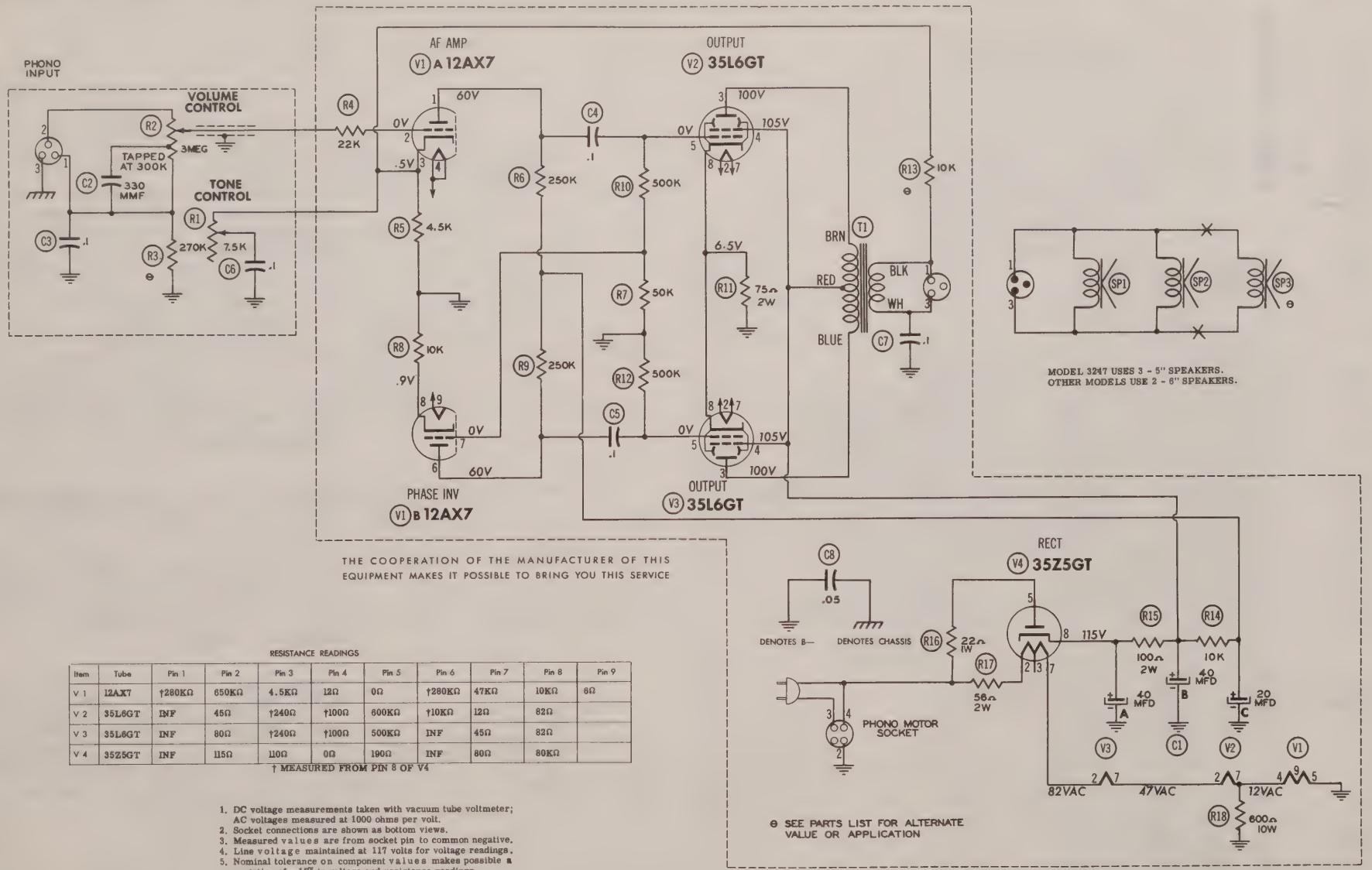
MISCELLANEOUS

ITEM No.	PART NAME	Silvertone PART No.	NOTES
	Cabinet	2180	Model 3247 - Includes motor board & hardware (Mahogany)
	Cabinet	2187	Model 4247 - Includes motor board & hardware (Mahogany)
	Cabinet	2187-0	Model 42471 - Includes motor board & hardware (limed oak)
	Knob	2424	Tone & volume

CHASSIS—BOTTOM VIEW



DENVER, COLORADO



RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	12AX7	†280KΩ	650KΩ	4.5KΩ	12Ω	0Ω	†280KΩ	47KΩ	10KΩ	6Ω
V 2	35L6GT	INF	45Ω	†240Ω	†100Ω	600KΩ	†10KΩ	12Ω	82Ω	
V 3	35L6GT	INF	80Ω	†240Ω	†100Ω	500KΩ	INF	45Ω	82Ω	
V 4	35Z5GT	INF	115Ω	110Ω	0Ω	190Ω	INF	80Ω	80KΩ	

† MEASURED FROM PIN 8 OF V4

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

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SYLVANIA MODELS 596B, BU, M, MU (Ch. 1-522-1, -2)

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MODEL 596MU

SYLVANIA MODELS 596B, BU, M, MU (Ch. 1-522-1, -2)

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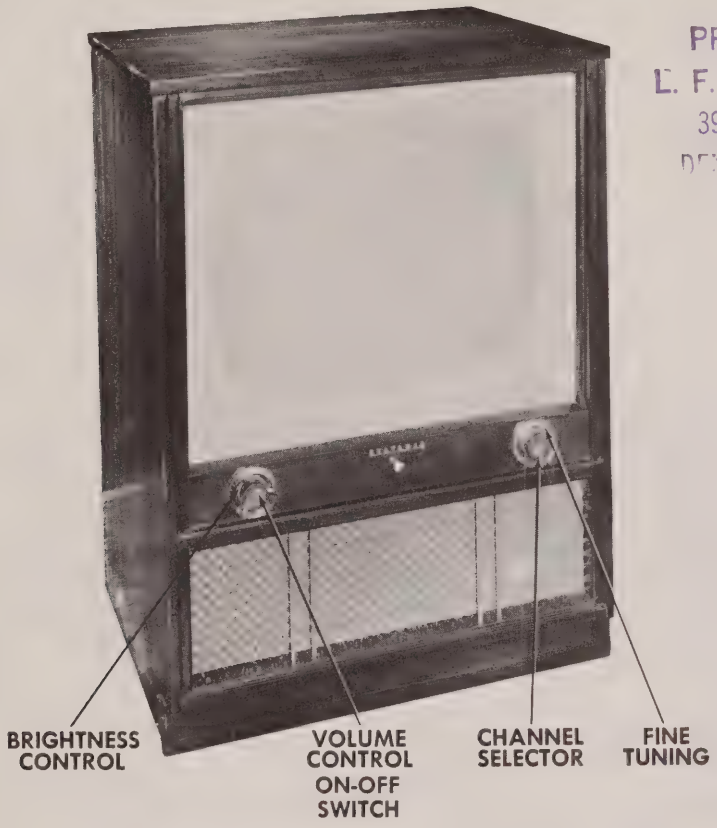

SYLVANIA MODEL 596MU

TRADE NAME	Sylvania Models 596B, 596M (Ch. 1-522-1 COl), 596BU, 596MU (Ch. 1-522-2 COl)
MANUFACTURER	Sylvania Electric Prod., Inc., Radio & Television Div., 254 Rano St., Buffalo, N.Y.
TYPE SET	Television Receiver
TUBES	Twenty-five
POWER SUPPLY	110-120 Volts AC - 60 Cycles RATING 2.12 Amp. @ 117 Volts AC
TUNING RANGE	Channels 2 thru 13 VHF, 14 thru 83UHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)

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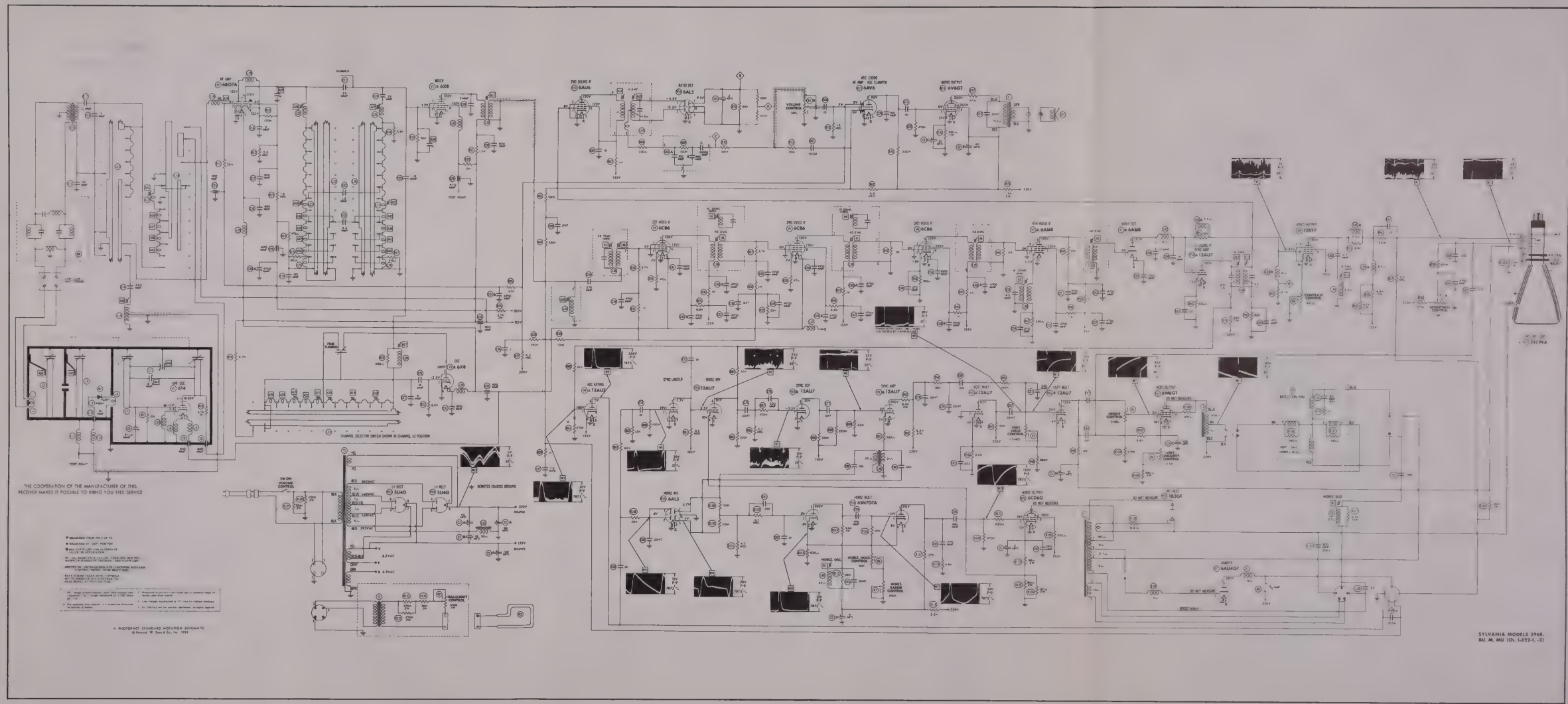
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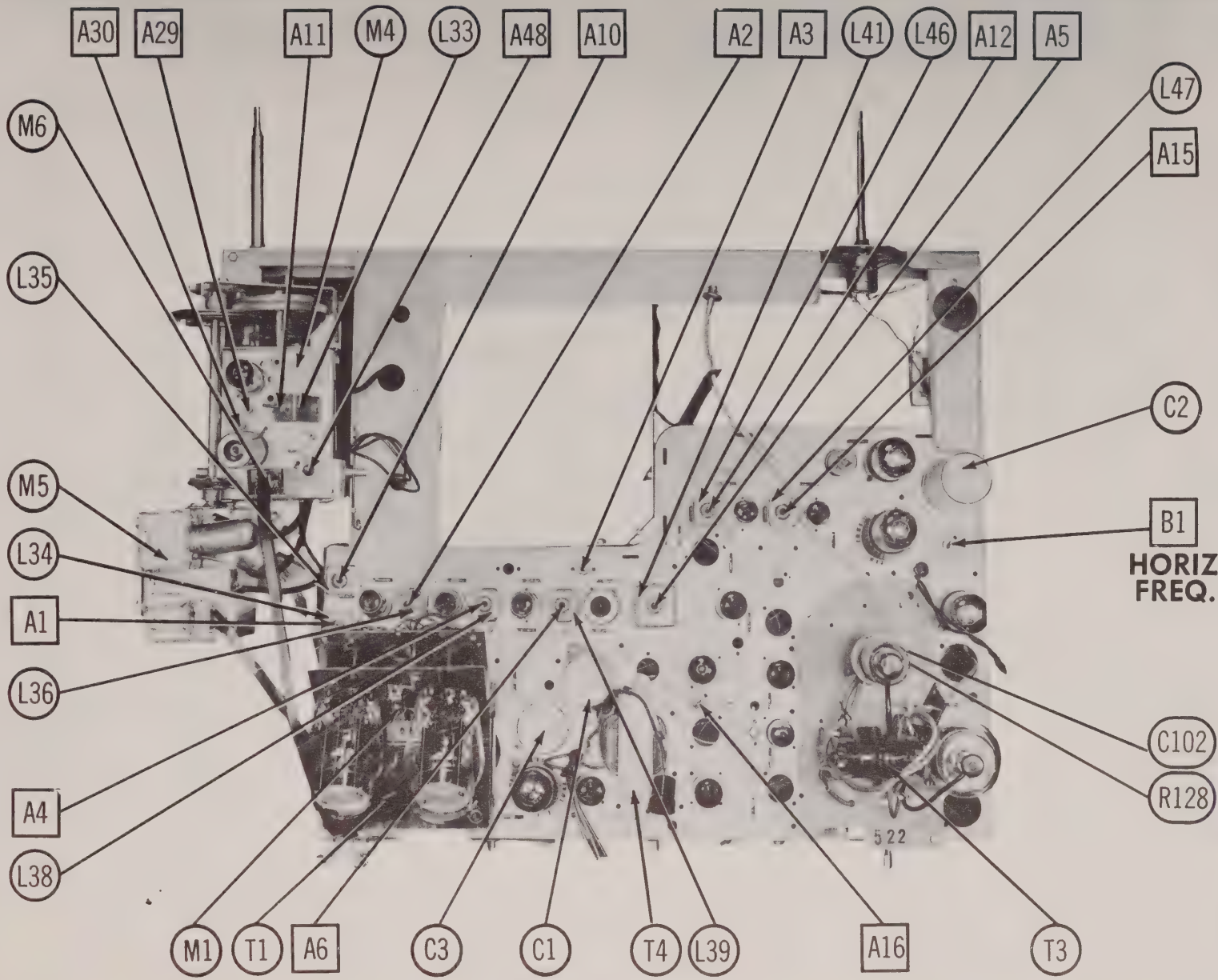

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CHASSIS TOP VIEW

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CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

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ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

The high voltage lead should be taped and kept away from chassis. Do not remove the horizontal oscillator tube to disable the high voltage. Connect the deflection yoke during alignment. Allow about 15 minutes for receiver and test equipment to warm-up. (Be sure VHF tuner shield is in place.)

VIDEO IF ALIGNMENT

Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	Direct	High side to an ungrounded tube shield floating over converter tube(V3). Low side to chassis.	Not used	39.75MC (Unmod)	Any unused high band channel	Use VTVM. DC probe to point Ⓐ. Common to chassis.	A1	Connect the negative lead of a 4.5 volt bias supply to the ungrounded side of C38. Connect positive lead to chassis. Adjust for MINIMUM deflection. Increase marker generator for usable reading on VTVM.
2.	"	"	"	41.25MC	"	"	A2, A3	"
3.	"	"	"	47.25MC	"	"	A4	"
4.	"	"	"	44.0MC	"	"	A5	Leave bias connected as in steps 1, 2 and 3. Attenuate marker generator output to maintain 1 to 2 volts on VTVM. Adjust for maximum deflection.
5.	"	"	"	42.0MC	"	"	A6	"
6.	"	"	"	45.2MC	"	"	A7	"
7.	"	"	"	43.2MC	"	"	A8	"
8.	"	High side to pin 7 (grid) of 6X8 (V3). Low side to chassis. Lower converter tube shield to normal position.	43.5MC (10MC Swp)	39.75MC 42.1MC 45.75MC	"	Vert. Amp. thru detector (Fig. 1) to pin 5 (plate) of 6CB6 (V4). Low side to chassis.	A9, A10, A11	Remove 4.5V bias. Disconnect primary of L36 from pin 5 of V4 and connect a 330Ω resistor from pin 5 of V4 to B+ end of L36. Alternately adjust A9, A10 and A11 until response curve similar to Fig. 2 is obtained. A9 and A11 places 45.75MC marker. A10 places 42.1MC marker. If necessary, retouch A1 for 39.75MC marker on response curve.
9.	"	High side to an ungrounded tube shield floating over dummy converter tube (V3). Low side to chassis.	"	41.25MC 42.1MC 45.0MC 45.75MC 47.25MC	"	Vert. Amp. thru 33KΩ to point Ⓐ. Low side to chassis.		Remove 330Ω resistor and restore connection to primary of L36. Reconnect 4.5V bias as in step 1. Use high scope gain and low sweep generator output. Check for response curve similar to Fig. 3. If necessary SLIGHTLY retouch A5 thru A11 to obtained desired response.

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Connect two matched 100KΩ (±1%) resistors in series from point Ⓑ to chassis. The junction of these two resistors is alignment point Ⓓ as shown on the schematic.
Short pin 1 (grid) of 6CB6 (V6) to ground.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
10.	.001MFD	High side thru 1KΩ to pin 2 (grid) of 6AM8 (V7) Low side to chassis.	4.5MC (unmod)	Any	DC probe to point Ⓑ. Common to chassis.	A12, A13, A14	Adjust for maximum deflection.
11.	"	"	"	"	DC probe to point Ⓒ. Common to point Ⓓ.	A15	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting. Remove short from pin 1 of V6.

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Short pin 1 (grid) of 6CB6 (V6) to ground.
Use frequency modulated signal with 60∿ modulation and 450KC sweep. Use 120∿ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
10.	.001MFD	High side to pin 2 (grid) of 6AM8 (V7). Low side to chassis.	4.5MC (450KC Swp)	4.5MC	Any	Vert. Amp. to point Ⓑ. Low side to chassis.	A12, A13, A14	Disconnect stabilizing capacitor C4. Adjust for curve of maximum amplitude and symmetry similar to Fig. 4.
11.	"	"	"	"	"	Vert. Amp. to point Ⓒ. Low side to chassis.	A15	Reconnect stabilizing capacitor C4. Adjust A15 so that 4.5MC occurs at center of crossover lines as in Fig. 5. SLIGHTLY retouch A14 for maximum amplitude and straightness of crossover lines. Remove short from pin 1 of V6.

ALTERNATE SOUND IF ALIGNMENT

If a 4.5MC signal of crystal accuracy is not available, the sound IF strip may be aligned by tuning in a strong TV station. Connect the VTVM and adjust A12, A13, A14 and A15 as outlined in steps 10 and 11 under "Sound IF Alignment Using AM Signal Generator and VTVM".

4.5MC TRAP ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
12.	.001MFD	High side to pin 2 (grid) of 12BY7 (V8). Low side to chassis.	4.5MC (unmod)	Any	DC probe thru detector (Fig. 1) to pin 11 (cathode) of picture tube. Common to chassis.	A16	Short pin 2 (grid) of 6AM8 (V7) to chassis. Adjust A16 for MINIMUM. Remove short from V7.

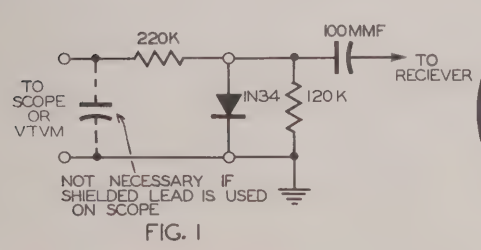

FIG. 1

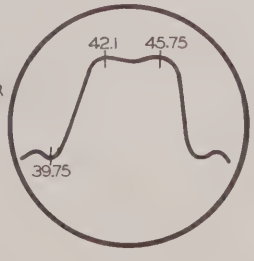

FIG. 2

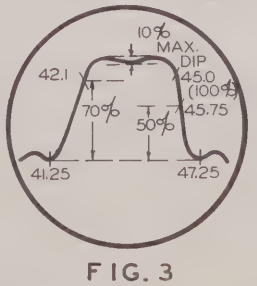

FIG. 3

FIG. 4

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ALIGNMENT INSTRUCTIONS (cont)

VHF TUNER OSCILLATOR ALIGNMENT

Connect the negative lead of a 2.5 volt bias supply to tuner AGC (green wire). Connect the positive lead to chassis. Remove V5 (6CB6) from its socket. During alignment, the use of two marker generators is required. Generator #1 (IF) is connected to one side of the antenna terminal, coupled loosely. If the sweep generator has a built in marker generator, it should be used as marker generator #2 (RF). If not, connect a second marker generator (RF) to the other side of antenna terminal, couple loosely. Use low marker generator output to avoid distortion of the response curve.
All connecting leads should be short as possible and shielded.
Use only enough sweep generator output for usable pattern on scope.
Set the fine tuning control so that the plates are approximately half meshed. Connect a short jumper between terminals 1 and 4 of L36.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Channels 5, 3 and 2 are adjusted by expanding or compressing coil turns.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
13.	Two 120Ω carbon resistors	Across antenna terminals with 120Ω in each lead.	215MC (20MC Swp)	211.25MC (RF marker) 45.75MC (IF marker)	13	Vert. amp. thru detector (Fig. 6) to pin 2 (cathode) of 6CB6 (V4). Low side to chassis.	A17	Adjust so that RF and IF markers coincide as in Fig. 7. Curves may not be symmetrical until RF alignment is complete.
14.	"	"	203MC (10MC Swp)	199.25MC 45.75MC	11	"	A18	"
15.	"	"	189MC (10MC Swp)	187.25MC 45.75MC	9	"	A19	"
16.	"	"	177MC (10MC Swp)	175.25MC 45.75MC	7	"	A20	"
17.	"	"	85MC (10MC Swp)	83.25MC 45.75MC	6	"	A21	"
18.	"	"	79MC (10MC Swp)	77.25MC 45.75MC	5	"	A22	IF RF and IF markers do not coincide as in Fig. 7, adjust A22 by expanding or compressing coil turns.
19.	"	"	69MC (10MC Swp)	67.25MC 45.75MC	4	"	A23	Adjust so that RF and IF markers coincide as in Fig. 7.
20.	"	"	63MC (10MC Swp)	61.25MC 45.75MC	3	"	A24	IF RF and IF markers do not coincide as in Fig. 7, adjust A24 by expanding or compressing coil turns.
21.	"	"	57MC (10MC Swp)	55.25MC 45.75MC	2	"	A25	If RF and IF markers do not coincide as in Fig. 7, adjust A25 by expanding or compressing coil turns.

ALTERNATE VHF TUNER OSCILLATOR ALIGNMENT USING TV SIGNAL

Tune in separately all VHF channels in area and rotate fine tuning control through its range. At one extreme end of the fine tuning control the picture should be almost blanked out with only sound bars noticeable on the screen. At the other extreme end of the fine tuning control there should be a picture with lack of detail. If the above cannot be obtained by rotating the fine tuning control, adjustment of the oscillator should be made. Proceed as follows:
1. Turn VHF tuner to highest frequency channel available between 7 and 13 in that area. Adjust A17 for proper range of the fine tuning control. A17 is a coarse oscillator adjustment for channels 7 thru 13. For fine adjustment of channels 7 thru 11, adjust as follows for proper fine tuning range.
Adjust A18 for channels 10 and 11.
Adjust A19 for channels 8 and 9.
Adjust A20 for channel 7.
2. Turn VHF tuner to highest frequency channel available between 2 and 6. Adjust A21 for proper fine tuning control range. A21 is a coarse oscillator adjustment for channels 2 thru 6. For fine adjustment of channels 3, 5 and 4, adjust A23 for proper fine tuning control range.

VHF TUNER RF ALIGNMENT

Care must be exercised not to disturb the preceeding aligned coil increments.
Disconnect R19 from chassis ground and connect a 1KΩ resistor from loose end of R19 and fasten other end of 1KΩ to chassis ground.
Connect bias as in "VHF Tuner Oscillator Alignment".
All connecting leads should be short as possible and shielded.
Use only enough sweep generator output for usable indication on scope.
Remove 6CB6 (V5) from its socket.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
22	Two 120Ω carbon resistors	Across antenna terminals with 120Ω in each lead.	213MC (20MC Swp)	45.75MC 43.1MC	13	Vert. amp. thru detector (Fig. 1) to pin 5 (plate) of 6CB6 (V4). Low side to chassis.	A9, A11	Disconnect primary of L36 from pin 5 of V4 a and connect a 330Ω resistor from pin 5 of V4 to B+ end of L36. Adjust for response similar to Fig. 9.
23.	"	"	"	211.25MC 215.75MC	"	Vert. amp. thru detector (Fig. 8) to junction of R19 and 1KΩ (added) resistor. Low side to chassis.	A26, A27 A28	Adjust A26 for maximum mid-band height. Adjust A27 for flat topped response. Adjust A28 for position of markers. See Fig. 10. Picture carrier should be 100%. Sound carrier may be low as 70%.
24.	"	"	177MC (10MC Swp)	175.25MC 179.75MC	7	"	A29, A30	Adjust for symmetrical response as in Fig. 10.
25.	"	"	207MC (20MC Swp)	205.25MC 209.75MC	12	"		Check each channel for response similar to Fig. 10. If not within limits, repeat steps 23 and 24. If necessary, make compromise adjustment of A26, A27, A28, A29 and A30 for best acceptable response.
			201MC (10MC Swp)	199.25MC 203.75MC	11			
			193MC (10MC Swp)	191.25MC 195.75MC	10			
			189MC (10MC Swp)	187.25MC 191.75MC	9			
			183MC (10MC Swp)	181.25MC 185.75MC	8			

FIG. 12

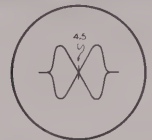


FIG. 5

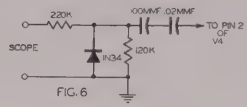


FIG. 6

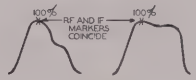


FIG. 7

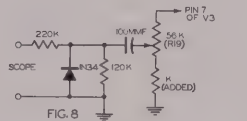
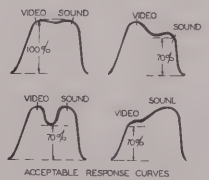


FIG. 8

FIG. 9



ACCEPTABLE RESPONSE CURVES
FIG. 10

VHF TUNER RF ALIGNMENT

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
26.	Two 120Ω carbon resistors.	Across antenna terminals with 120Ω in each lead.	85MC (10MC Swp)	83.25MC 87.75MC	6	Vert. amp. thru detector (Fig.) to pin 5 (plate) of 6CB6 (V4). Low side to chassis.	A31, A32, A33	Adjust A31 for maximum mid-band height. Adjust A32 for flat topped response. Adjust A33 for proper marker position. See Fig. 10.
27.	"	"	79MC (10MC Swp)	77.25MC 81.75MC	5	"	A34, A35, A36	Compress or expand coil turns for curve similar to Fig. 10. Picture and sound markers should remain on top of curve.
28.	"	"	69MC (10MC Swp)	67.25MC 71.75MC	4	"	A37, A38, A39	"
29.	"	"	63MC (10MC Swp)	61.25MC 65.75MC	3	"	A40, A41, A42	"
30.	"	"	57MC (10MC Swp	55.25MC 59.75MC	2	"	A43, A44, A45	"
31.	Recheck all channels for flat topped response. If necessary, retouch A26 thru A45 in order given. A dip of 10% is permissable on all channels. Remove 330Ω resistor from plate of V4 to B+. Restore connection to L36. Replace V5 in its socket. Remove test equipment. Remove 1KΩ resistor from tuner and reconnect R19 to chassis.							

UHF OSCILLATOR ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
32	Two 120Ω carbon resistors	Across UHF antenna terminals with 120Ω in each lead.	900MC (unmod)	82 UHF tuning cap. fully open.	DC probe to point ⓐ. Commos to chassis.	A46	Adjust for maximum deflection.
	"	"	460MC (unmod)	14 UHF tuning cap. fully closed.	"	A47	Adjust for maximum deflection. Recheck step 32.

UHF OUTPUT CIRCUIT ALIGNMENT

Connect the negative lead of a 2.5 volt bias supply to VHF tuner AGC terminals. Connect positive lead to chassis.
Disconnect primary winding of L36 from pin 5 (plate) of 6CB6 (V4) and connect a 330Ω resistor from B+ end of L36 to pin 5 of V4.
Remove UHF tuner section from chassis and remove 1N82A crystal. Solder a 270Ω resistor to mixer loop side of crystal holder. Remount tuner to bracket and reconnect ground strap. If a separate marker generator is used, couple it loosely to crystal holder side of 270Ω resistor.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
34	270Ω Resistor	High side to loose end of 270Ω resistor. Other end of 270Ω resistor to mixer loop of crystal holder. Low side to chassis.	43.5MC (20MC Swp)	43.1MC 45.75MC	UHF (Tuning cap. fully meshed)	Vert. Amp. thru detector (Fig. 2) to pin 5 of V4. Low side to chassis.	A48	Adjust for response similar to Fig. 3. Remove sweep generator and 270Ω resistor from crystal holder. Remount UHF tuner, so ends of capacitor plates are up. Replace 1N82A crystal.

UHF PRESELECTOR ALIGNMENT

Leave bias connected as under "UHF Output Circuit Alignment". Leave 330Ω resistor in plate circuit of V5.
Couple separate marker generator loosely to pin 2 of 6CB6 (V4).
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
35.	See Fig. 11	Thru matching pad (Fig. 4) to UHF ant. terminals.	473MC thru 887MC (20MC Swp)	43.1MC 45.75MC	14 thru 83	Vert. Amp. thru detector (Fig. 5 to pin 5 of V4. Low side to chassis.	A49, A50	Turn tuner and sweep generator simultaneously thru the UHF tuning range and observe response curve which should be similar to Fig. 12. Adjust A49 and A50 for best compromise tilt and dip. If necessary further adjust by SLIGHTLY bending rotor plates. Make adjustment at point where rotor is just meshing with stator. Disconnect test equipment. Remove 330Ω resistor from pin 5 of V4 and restore connection to L36. Replace V5 in its socket. Remount UHF tuner in normal position.

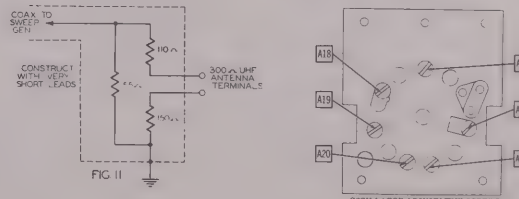
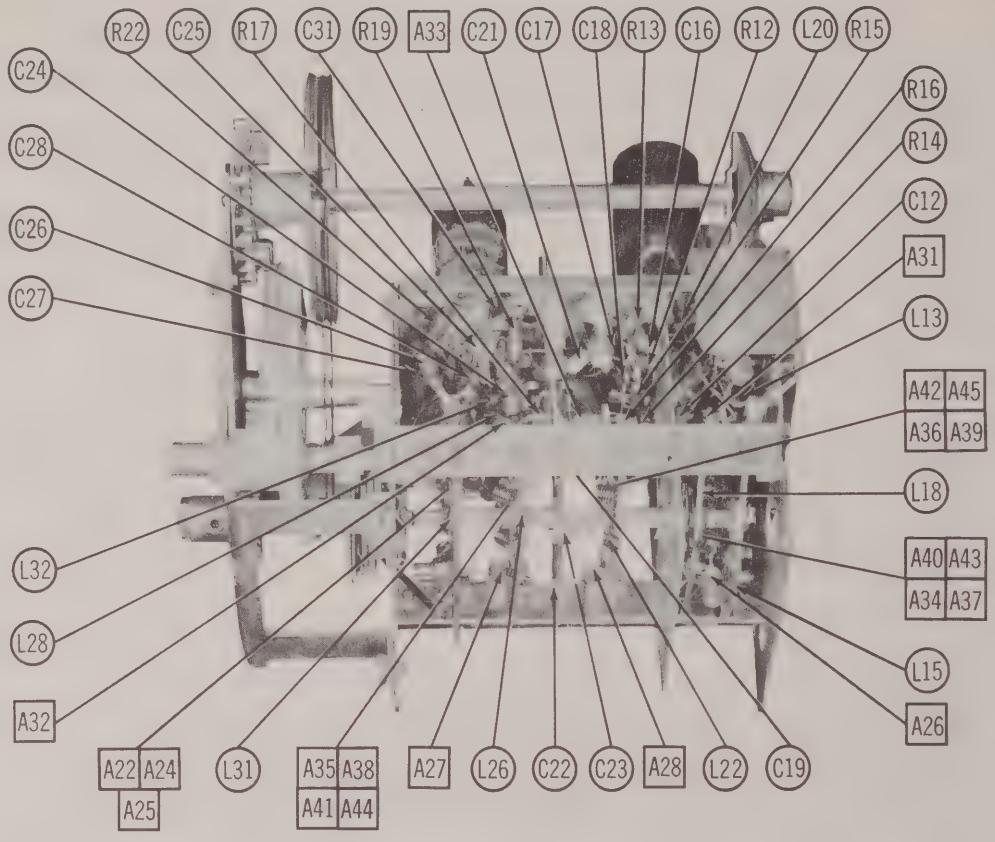
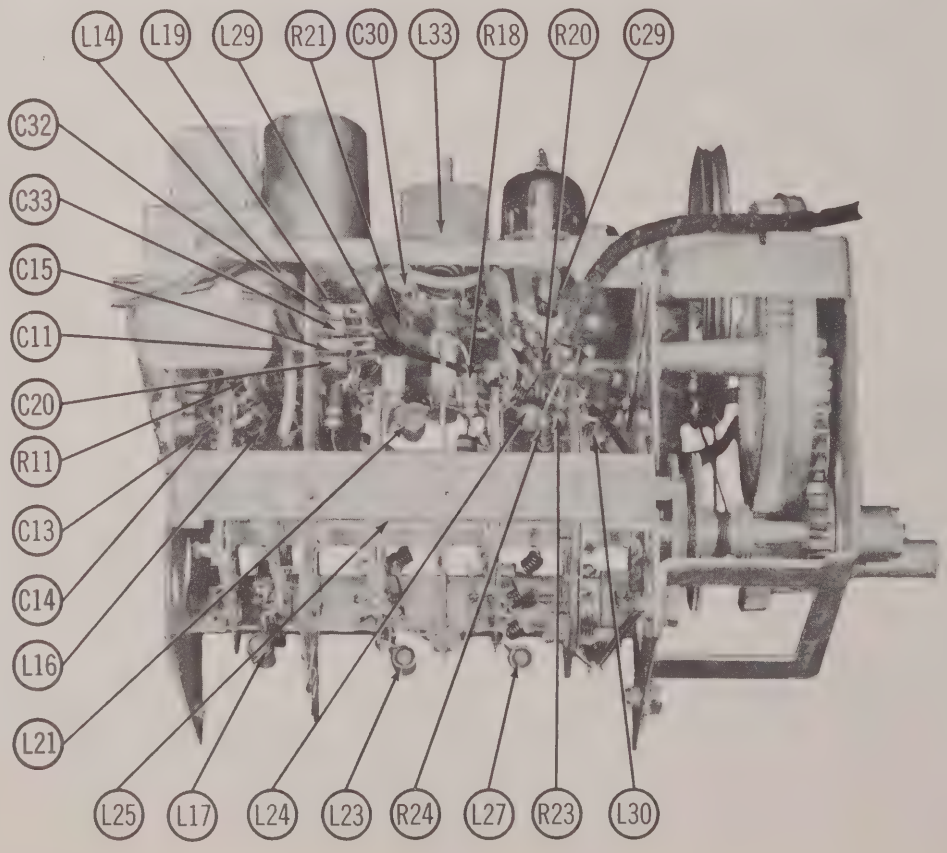


FIG 11

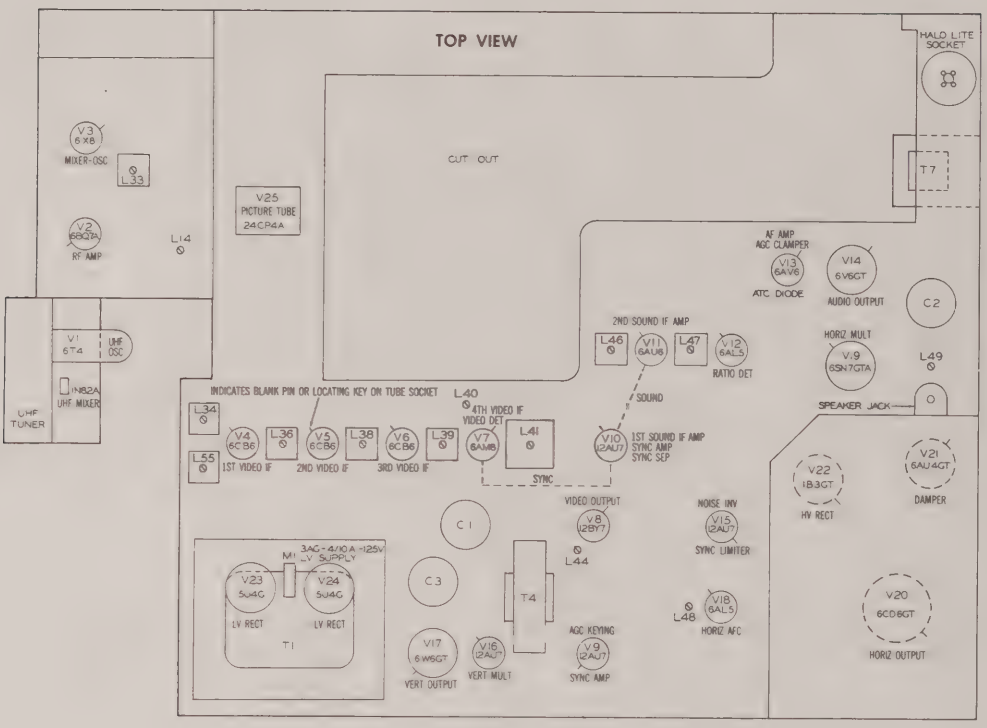


VHF TUNER-RIGHT SIDE



VHF TUNER-LEFT SIDE

TUBE PLACEMENT CHART



TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound - V23, V24

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - V3, V4, V5, V6, V7 (V1 UHF only)
No pic, no sound, has snow - V2, V3, V4
No pic, has sound, has raster - V8, V9, V25
Has pic, no sound - V10, V11, V12, V13, V14
Overloaded picture - V9, V13

SYNC FAILURE
No vert. sync - V9, V16
No horiz. sync - V9, V18, V19
No vert. or horiz. sync - V9, V10

SWEEP FAILURE
No raster, has sound - V19, V20, V21, V22, V25, Fuse (M1)
No vertical deflection - V16, V17
Poor vert. linearity or foldover - V16, V17
Poor horiz. linearity or foldover - V19, V20, V21
Narrow picture - V19, V20, V21, V22, V23, V24
Vert. off freq. - V9, V16
Horiz. off freq. - V9, V18, V19

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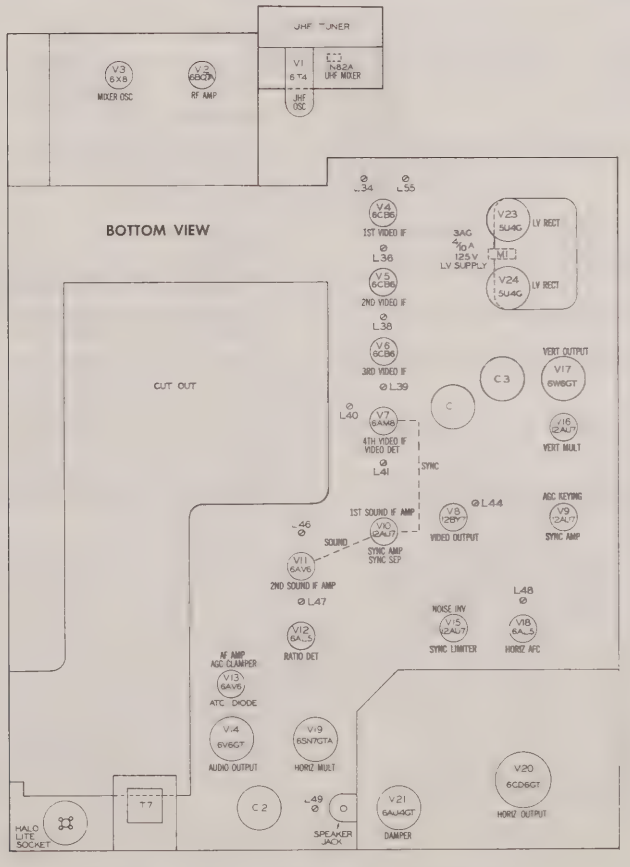
RESISTANCE MEASUREMENTS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6T4	*‡4. 7KΩ	10KΩ	. 1Ω	0Ω	0Ω	10KΩ	*‡4. 7KΩ		
V 2	6BQ7A	†1. 1Meg	600KΩ	0Ω	0Ω	. 1Ω	†3. 2KΩ	†1Meg	†1. 1Meg	0Ω
V 3	6X8	0Ω	8. 2KΩ	‡4. 7KΩ	0Ω	. 1Ω	0Ω	56KΩ	‡10KΩ	‡1. 2KΩ
V 4	6CB6	35KΩ	47Ω	0Ω	. 1Ω	‡1KΩ	‡6. 8KΩ	0Ω		
V 5	6CB6	35KΩ	47Ω	. 1Ω	0Ω	‡1KΩ	‡6. 8KΩ	0Ω		
V 6	6CB6	. 1Ω	180Ω	0Ω	. 1Ω	‡1KΩ	‡1KΩ	0Ω		
V 7	6AM8	330Ω	. 1Ω	‡1KΩ	. 1Ω	0Ω	‡1KΩ	. 1Ω	2. 7KΩ	0Ω
V 8	12BY7	300Ω	2. 7KΩ	300Ω	. 1Ω	. 1Ω	0Ω	‡3. 5KΩ	‡0Ω	300Ω
V 9	12AU7	†15KΩ	22KΩ	360Ω	0Ω	0Ω	150KΩ	†50KΩ	‡0Ω	. 1Ω
V 10	12AU7	†30KΩ	2. 7KΩ	330Ω	0Ω	0Ω	‡330KΩ	3. 2Meg	0Ω	. 1Ω
V 11	6AU6	82KΩ	0Ω	. 1Ω	0Ω	‡1KΩ	‡1KΩ	0Ω		
V 12	6AL5	INF	INF	. 1Ω	0Ω	0Ω	0Ω	68KΩ		
V 13	6AV6	15Meg	0Ω	0Ω	. 1Ω	500KΩ	800KΩ	†220KΩ		
V 14	6V6GT	TP	. 1Ω	†2KΩ	†1. 5KΩ	470KΩ	TP	0Ω	390Ω	
V 15	12AU7	‡22Meg	100KΩ	0Ω	0Ω	0Ω	†70KΩ	‡22Meg	90Ω	. 1Ω
V 16	12AU7	†150KΩ	0Ω	2. 2KΩ	. 1Ω	. 1Ω	▲1. 2Meg	1. 6Meg	2. 2KΩ	0Ω
V 17	6W6GT	NC	. 1Ω	†400Ω	†900Ω	1. 3Meg	TP	0Ω	1. 2KΩ	
V 18	6AL5	110KΩ	110KΩ	0Ω	. 1Ω	4. 8Meg	0Ω	4. 8Meg		
V 19	6SN7GTA	10Meg	†8KΩ	820Ω	110KΩ	†50KΩ	820Ω	0Ω	. 1Ω	
V 20	6CD6G	TP	0Ω	160Ω	TP	470KΩ	TP	. 1Ω	‡220Ω	Top Cap ▲10Ω
V 21	6AU4GT	NC	NC	300KΩ	TP	†5Ω	TP	. 1Ω	0Ω	
V 22	1B3GT		PINS	1 - 8	HAVE	INFINITE	RESISTANCE			Top Cap ▲170Ω
V 23	5U4G	NC	60KΩ	NC	45Ω	NC	45Ω	TP	60KΩ	
V 24	5U4G	NC	110KΩ	NC	50Ω	NC	50Ω	NC	110KΩ	
V 25	24CP4A	60KΩ	†850KΩ	Pin 10 ▲120KΩ	Pin 11 ‡330KΩ	Pin 12 60KΩ				

* MEASURED IN "UHF" POSITION
‡ MEASURED FROM PIN 8 OF V23
† MEASURED FROM PIN 8 OF V24
▲ MEASURED FROM PIN 3 OF V21
ALL MEASUREMENTS TAKEN IN "VHF" POSITION UNLESS OTHERWISE DESIGNATED



TUBE PLACEMENT CHART

SET 281 FOLDER 8

SYLVANIA MODELS 596B, BU, M, MU (Ch. 1-522-1, -2)

TROUBLE SHOOTING AIDS

SWEEP

HORIZONTAL

LOSS OF SWEEP

Follow procedure outlined under "Loss of High Voltage".

INSUFFICIENT SWEEP

Check by substitution V20, V21, V23 and V24. Check adjustment B2. Check C95, C96, C5, R125 and other associated components. Check T3 and T5A.

DRIVE LINES

Check by substitution V20 and V21. Check T3, T5A, C95, C96, R125 and other associated components.

COMPRESSED LEFT SIDE

Check by substitution V20 and V21. Check horizontal output and damper stages for component failure or change of value.

FOLDS

Follow procedure outlined under "Drive Lines".

PIE CRUST EFFECT

Check by substitution V19, V20 and V21. Check C92 for open. Check L49, C93, C91, R113 and other associated components.

XMAS TREE EFFECT

Check by substitution V19, V20 and V21. Check T3 and T5 for internal arcing. Check L49, C98, C99, C93, R109, R110 and other associated components.

VERTICAL

LOSS OF SWEEP

Check by substitution V16 and V17. Check waveform W11.

If Satisfactory	If Unsatisfactory
Check T4, T5B, R105, C3C and other associated components.	Check C82, C87, R101, R99, R97, R96 and other associated components.

INSUFFICIENT SWEEP

Check by substitution V16 and V17. Check height and vertical linearity controls for proper operation. Check R99, T4 and other associated components.

COMPRESSED AT BOTTOM

Check by substitution V16 and V17. Check R101, R99, R5, C87 and other associated components.

COMPRESSED AT TOP

Check by substituion V16 and V17. Check R4, R104, C3C, C87, T4 and other associated components.

FOLDS

Check by substitution V16 and V17. Check C84, C87, R102, R103, R104 and other associated components.

SYNC

LOSS OF VERTICAL AND HORIZONTAL SYNC

Check by substitution V9, V10 and V15. Check C73, C75, C77, R79, R88, R89, R92 and other associated components.

LOSS OF VERTICAL SYNC - HORIZONTAL SYNC SATISFACTORY

Substitute V16. Check vertical integrator network. Check R96, R98, R3, R97, C82 and other associated components.

LOSS OF HORIZONTAL SYNC - VERTICAL SYNC SATISFACTORY

Check by substitution V18 and V19. Check C88, C89, C91, C92, R114, L49 and other associated components.

HORIZONTAL BENDING

Check by substitution V9, V10, V15, V18 and V19. Check horizontal AFC network.

VIDEO

LOSS OF VIDEO

Substitute V8. Check L45, C61, C60, R54, R55 and other associated components.

SOUND BARS (4.5MC Beat)

Adjust tuner fine tuning for best sound and picture. Check adjustment A16. Check video IF alignment.

POOR CONTRAST

Substitute V8. Check contrast control. Check L45, R53, R56, C60, C61 and other associated components.

NEGATIVE PICTURE

Substitute V8. Check picture tube. Check L43, L42, R53, C61 and other associated components. Check video detector network.

SMEAR

Substitute V8. Check L42, L43, L45, C61, R53 and other associated components.

WIDE BLACK BAR ACROSS PICTURE

Check by substitution V2, V4, V5, V6, V7 and V8 for heater to cathode leakage.

AUDIO

WEAK OR NO SOUND

Check by substitution V10, V11, V12, V13 and V14. Check stages V13 and V14 using audio signal generator. Apply audio signal across R1B.

If Satisfactory	If Unsatisfactory
Check ratio detector and audio IF stages for component failure or change of value.	Check C67, C68, C70, C71, C72, C2B, C2C, R78, R76, R74, T7, speaker and other associated components.

BUZZ

Adjust tuner fine tuning for best sound and picture. Check adjustment A15 for minimum buzz. If still unsatisfactory, check audio IF alignment.

DISTORTED

Follow procedure outlined under "Weak or No Sound".

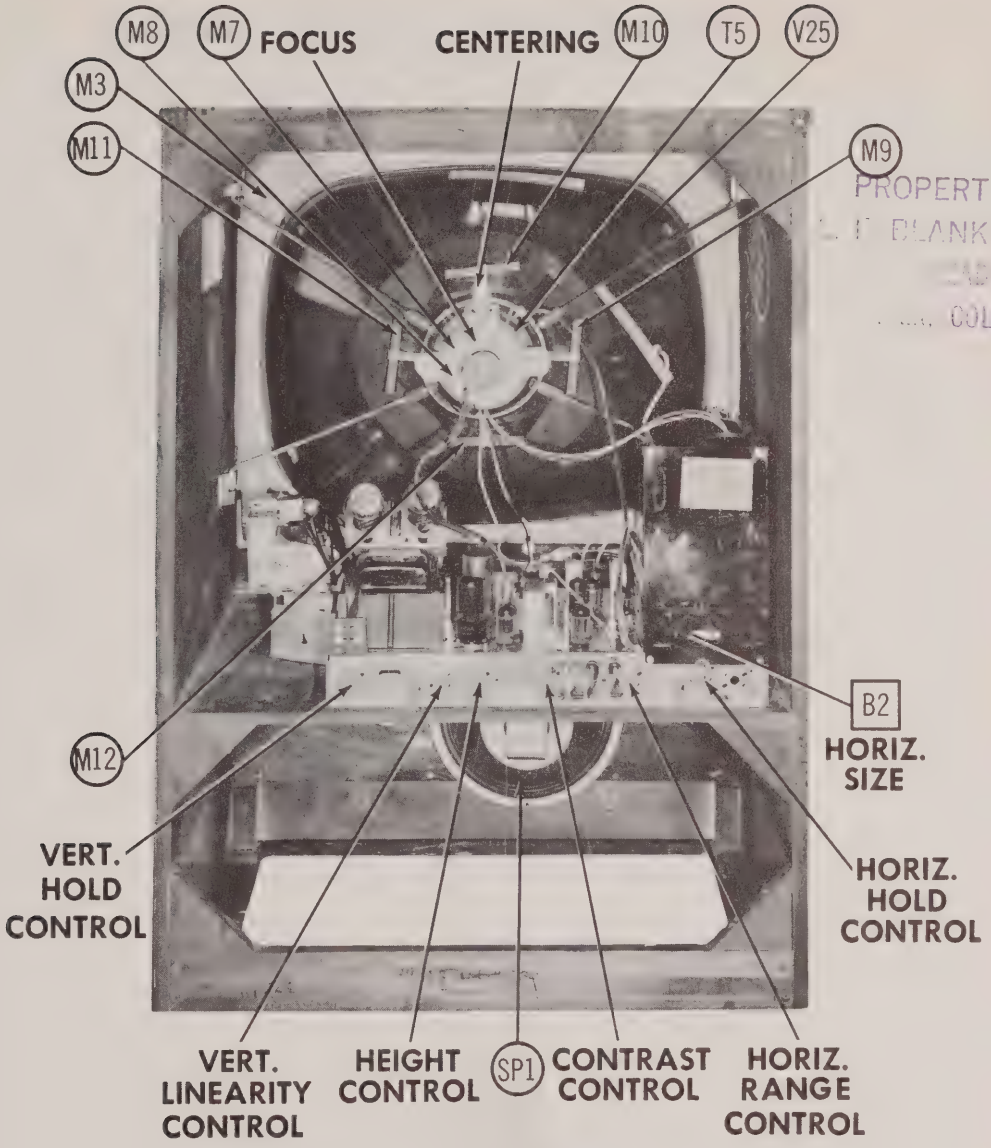
POWER

DEAD SET

If filaments fail to light, check AC interlock assembly. Check switch on volume control and T1. If filaments light, check by substitution V23 and V24. Check B+ filter and decoupling network.

SMALL AND/OR DIM PICTURE

Check by substitution V23 and V24. Check B+ filter and decoupling network.



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CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Tune in a TV station, preferably a test pattern.

Adjust the horizontal size slug (B2) for a picture slightly wider than necessary to fill the mask horizontally.

Connect a clip lead from junction of R91 and C88 to chassis.

Short out horizontal oscillator coil (L49) with clip lead across terminals.

Set the horizontal hold control at its center range position.

Adjust the horizontal range control (R7) until picture locks in horizontally, picture may move back and forth across screen.

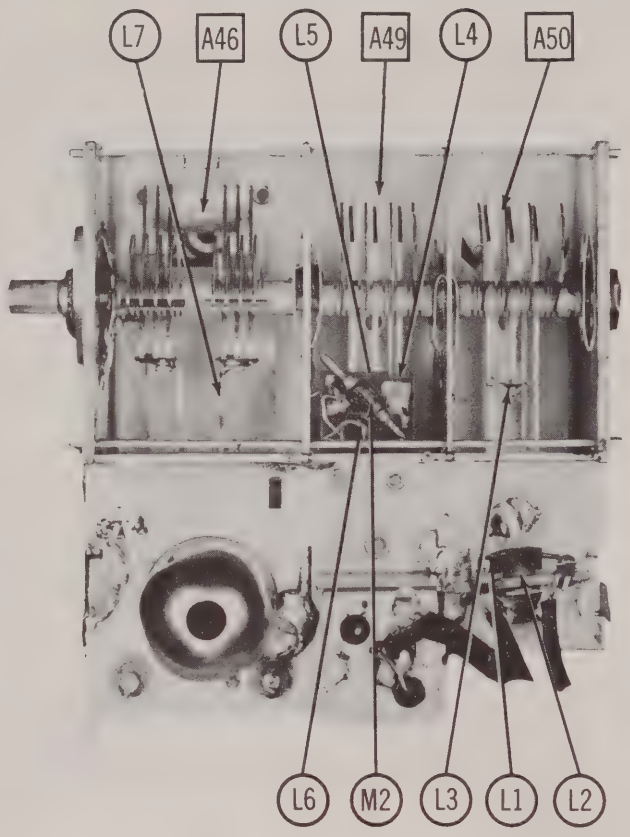
Remove short from L49.

Adjust the horizontal oscillator slug (B1) for horizontal sync.

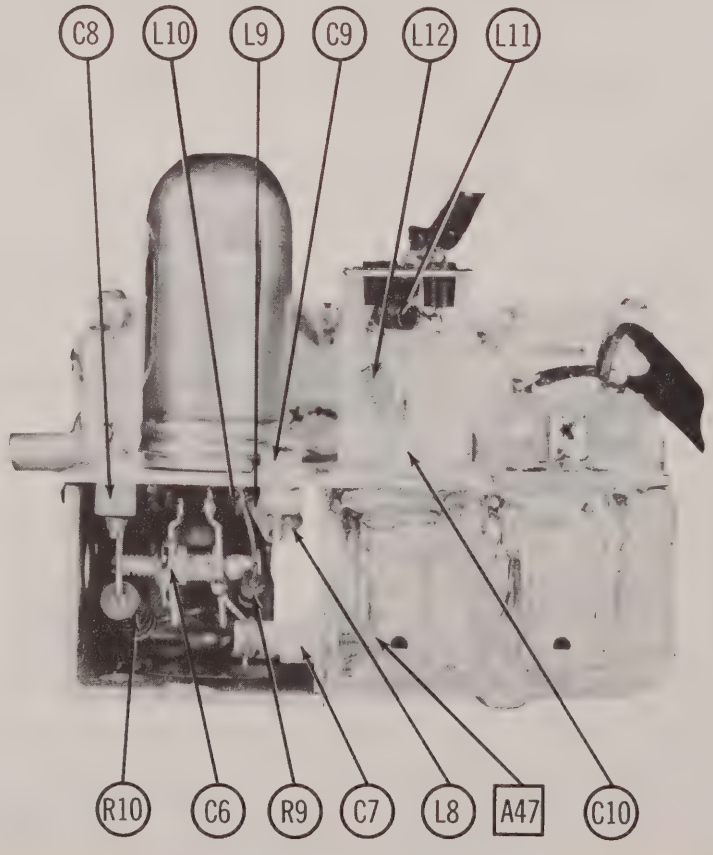
Remove the short from junction of R91 and C88 to chassis.

The picture should stay locked in horizontal sync while slowly rotating horizontal hold control over its range.

If necessary slightly readjust the horizontal range control.



UHF TUNER TOP VIEW



UHF TUNER-RIGHT SIDE

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		SYLVANIA PART No.	STANDARD REPLACEMENT		
V1	UHF Oscillator	6T4	6T4	7DK	
V2	RF Amplifier	6BQ7A	6BQ7A	9AJ	
V3	Mixer-Osc.	6X8	6X8	9AK	
V4	1st. Video IF Amp.	6CB6	6CB6	7CM	
V5	2nd. Video IF Amp.	6CB6	6CB6	7CM	
V6	3rd. Video IF Amp.	6CB6	6CB6	7CM	
V7	4th. Video IF Amp.- Video Detector	6AM8	6AM8	9CY	
V8	Video Output	12BY7	12BY7	9BF	
V9	AGC Keying- Sync Amplifier	12AU7	12AU7	9A	
V10	1st. Sound IF Amp.- Sync Amp.- Sync Separator	12AU7	12AU7	9A	
V11	2nd. Sound IF Amp.	6AU6	6AU6	7BK	
V12	Ratio Detector	6AL5	6AL5	6BT	
V13	AF Amplifier- AGC Clamper- ATC Diode	6AV6	6AV6	7BT	
V14	Audio Output	6V6GT	6V6GT	7S	
V15	Noise Inverter- Sync Limiter	12AU7	12AU7	9A	
V16	Vert. Mult.	12AU7	12AU7	9A	
V17	Vert. Output	6W6GT	6W6GT	7S	
V18	Horiz. AFC	6AL5	6AL5	6BT	
V19	Horiz. Mult.	6SN7GTA	6SN7GTA	8BD	
V20	Horiz. Output	6CD6G	6CD6G	5BT	
V21	Damper	6AU4GT	6AU4GT	4CG	
V22	HV Rectifier	1B3GT	1B3GT	3C	
V23	LV Rectifier	5U4G	5U4G	5T	
V24	LV Rectifier	5U4G	5U4G	5T	

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CATHODE-RAY TUBE

ITEM No.	REPLACEMENT DATA					RETMA BASE TYPE	NOTES
	SYLVANIA PART No.	CBS-HYTRON PART No.	GENERAL ELECTRIC PART No.	SYLVANIA PART No.	WESTINGHOUSE PART No.		
V25	24CP4A ①	24CP4A ① 24CP4	24CP4A ①	24CP4A ① 24CP4	24CP4A ①	12N 12N	① Aluminized

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT	SYLVANIA PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1A	▲40	400	161-2010			FP376.5	TM-3052	D-405	
B	▲16	200							
C2A	▲80	400	161-4015			FP430.6	TM-4023	Q-390	
B	■40	400				TC70	TD-40-450	FM-4504	
C	25	25							
D	▲4	400							
C3A	■150	200	161-3019					Q-253	
B	▲10	450							
C	▲100	50							
C4	2	50	161-1001			TC302	TD-2-50	MMT-0505	
C5	2	50	161-1001			TC302	TD-2-50	MMT-0505	
C6	.3-1.5								
C7	.5-5								
C8	800			FT-1000	357-102				
C9	800			FT-1000	357-102				
C10	30								
C11	10								
C12	22			D6-220	GP1K-220	UC-5422			
C13	5			TCZ-5	NP0A-050	ZT-555			
C14	220			D6-221	GP2K-221	UC-5322			
C15	800			MFT-1000					
C16	2			TCZ-2R2	NP0A-2R2				
C17	800			DD-801	831-801	DC-521			
C18	800			DD-801	831-801	DC-521			
C19	150			DD-151	811-151	UC-5315			
C20	800			MFT-1000					
C21	.33								
C22	1.2			TCZ-1R2	NP0A-1R2	ZT-5515			
C23	3.3			TCZ-3R3	NP0A-3R3	ZT-5533			
C24	33			D6-330	GP1K-330	UC-5433			
C25	1.8								
C26	18								
C27	8								
C28	5			TCZ-5	NP0A-050	ZT-555			
C29	470			MFT-500					
C30	800			DD-801	831-801	DC-521			
C31	800			DD-801	831-801	DC-521			
C32	800			MFT-1000					
C33	800			MFT-1000					
C34A	4700		168-001ID	DD2-502	811-0047	DC-525		C-1247	
B	4700				811-0047	DC-525		C-1247	
C35	270		166-0270N	D6-271	GP2K-271	UC-5327		K-1327	
C36	.1	200	160-0201	DF-104		PT401	IMP2-P1	330201	
C37	1.0	200	169-0018			PT41	CT2-1	330210	
C38	.047	200	160-02147	DF-503		PT4147	IMP2-S47	3302147	
C39	4700		166-4700D	DD-472	811-0047	DC-525		C-1247	
C40A	4700		168-001ID	DD2-502	811-0047	DC-525		C-1247	
B	4700				811-0047	DC-525		C-1247	
C41	1000		166-1000D	DD-102	801-001	DC-521		K-1210	
C42	4700		166-4700D	DD-472	811-0047	DC-525		C-1247	
C43	4700		166-4700D	DD-472	811-0047	DC-525		C-1247	
C44	4700		166-4700D	DD-472	811-0047	DC-525		C-1247	
C45A	4700		168-001ID	DD2-502	811-0047	DC-525		C-1247	
B	4700				811-0047	DC-525		C-1247	
C46	1000		166-1000D	DD-102	801-001	DC-521		K-1210	
C47	4700		166-4700D	DD-472	811-0047	DC-525		C-1247	

PARTS LIST AND DESCRIPTIONS (Continued)

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CAPACITORS (cont)

ITEM No.	RATING CAP	RATING VOLT	SYLVANIA PART No.	CENTRALAB PART No.	ERIE MERIT PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	NOTES
C48A	4700		168-0001D	DD2-502	811-0047	DC-525		C-1247	
B	4700				811-0047	DC-525		C-1247	
C49	270		168-0270N	D6-271	GP2K-271	UC-5327		K-1327	
C50	1000		168-1000D	DD-102	801-001	DC-521		K-1210	
C51	4700		168-4700D	DD-472	811-0047	DC-525		C-1247	
C52	4700		168-4700D	DD-472	811-0047	DC-525		C-1247	
C53	4700		168-4700D	DD-472	811-0047	DC-525		C-1247	
C54	270		168-0270N	D6-271	GP2K-271	UC-5327		K-1327	
C55	1000		168-1000D	DD-102	801-001	DC-521		K-1210	
C56	43		168-0043P	TC2-43	NP0K-430				
C57	4700		168-4700D	DD-472	811-0047	DC-525		C-1247	
C58	10		168-0010P	TC2-10	NP0K-100	Z7-541			
C59	10		168-0010P	TC2-10	NP0K-100	Z7-541			
C60	4.7		168-0008N	TC2-4R7	NP0A-4R7	Z7-555			
C61	.22	200	160-02022			PT4022	IMP2-P22	3302622	
C62	4700		168-4700D	DD-472	811-0047	DC-525		C-1247	
C63	.01	200	160-0211	D6-103	GP2-333-103	PT4U	IMP4-S1	330411	
C64	470	500	163-0471	D6-471	GP2K-471	MC245		K-1247	
C65	.01	400	160-0211	D6-103	GP2-333-103	PT4U	IMP4-S1	330411	
C66A	330			D6-331	GP3K-331	UC-5333		K-1333	
B	680		4180-0013	D6-681	GP2K-681	UC-5368		K-1368	
C	10000			D6-103	811-01	DC-511		33061	
C67	.0022	600	160-06323	D6-223	GP3-333-222	PT2322	IMP6-D22	3302322	
C68	.01	200	160-0211	D6-103	GP3-333-103	PT4U	IMP4-S1	330411	
C69	.047	200	160-02147	DF-533		PT4U47	IMP3-S47	3304147	
C70	.006	500	163-0100	D6-101	GP1K-101	MC256		K-1310	
C71	.01	600	160-0611	D6-103	GP3-333-103	PT6U	IMP6-S1	330611	
C72	.0047	600	160-06247	D6-472	GP2-333-472	PT6247	IMP6-D47	3306247	
C73	.01	600	160-0611	D6-103	GP3-333-103	PT6U	IMP6-S1	330611	
C74	.01	200	160-0211	D6-103	GP3-333-103	PT4U	IMP4-S1	330411	
C75	.0047	400	160-04247	D6-472	GP2-333-472	PT4247	IMP6-D47	3306247	
C76	220	500	163-0220	D6-221	GP2K-221	MC240		K-1322	
C77	.047	200	160-02147	DF-503		PT4U47	IMP2-S47	3302147	
C78	.0047	600	160-06347	D6-472	GP2-333-472	PT6247	IMP6-D47	3306247	
C79	.0047	600	160-06247	D6-472	GP2-333-472	PT6247	IMP6-D47	3306247	
C80	.001	600	160-0611	D6-102	GP2L-102	PT6U1	IMP6-D1	330611	
C81	330	500	163-0330	D6-331	GP2K-331	UC-5333		K-1333	
C82	.0047	600	160-06247			MC2645		CR-1247	
C83	.022	200	160-02122	DF-503	817-01	PT4U22	IMP4-S22	3302122	
C84	.047	600	160-06147	DF-503		PT6U47	IMP6-S47	3306147	
C85	.022	600	160-06122	DF-503	817-01	PT6U22	IMP6-S22	3306122	
C86	.022	600	160-06122	DF-303	817-01	PT6U22	IMP6-S22	3306122	
C87	.1	400	160-0401	DF-104		PT4U1	IMP4-P1	330401	
C88	.001	400	160-0431	D6-102	GP2L-102	PT4U1	IMP4-D1	330431	
C89	.001	400	160-0431	D6-102	GP2L-102	PT6U1	IMP6-D1	330631	
C90	.0047	400	160-04347	D6-472	GP2-333-472	PT6247	IMP6-D47	3306247	
C91	.001	200	160-0231	D6-102	GP2L-102	PT4U1	IMP4-D1	330431	
C92	.01	200	160-0211	D6-103	GP3-333-103	PT4U1	IMP4-S1	330411	
C93	.0047	400	160-04347	D6-472	GP2-333-472	PT6247	IMP6-D47	3306247	
C94	470	500	163-0470			MC2645		KR-1347	
C95	470	500	163-0470			MC2645		KR-1347	
C96	680	500	163-0680					KR-1368	
C97	1000		166-1000D	DD-103	801-001	DC-521		K-1310	
C98	.01	200	160-0211	D6-103	GP2-333-103	PT4U1	IMP4-S1	330411	
C99	.0056	600	160-06256	D6-562	GP2-333-563			3306256	Note 1
C100	.22	600	160-06223			PT6U22	IMP6-P22	3306222	
C101	.082	600	160-06283					3306283	
C102	500	20000	169-0015	TV3-502	413	HV10035A			
C103	.82	.2000		D030-822					

Note 1. Some versions use .0022MFD in this application. (Part #160-06222).
* Items C66A, C66B, C66C and R69 are combined in one unit.

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	SYLVANIA PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	1Meg		157-0033	*QJ-700		FI-51	UX1684B	Brightness - Panel
B	1Meg					R2-53		Volume - Rear
C	Switch					R3-1		Attach to R1B
R2	350KΩ	1	153-0023					HaloLight
R3A	1.5Meg	1/2	153-0024	QU-138	A47-15Meg-S	AB-742	U-155	Vert. Hold
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Not Req.	Attach to R3A
R4A	2500Ω	1/2	153-3011	WK-2500	A47-3000-S	AB-7	R2500L	Vert. Linearity
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Not Req.	Attach to R4A
R5A	1.5Meg	1/2	153-0014	QU-138	A47-15Meg-S	AB-742	U-155	Height
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Not Req.	Attach to R5A
R6A	500Ω	1	153-0009	QU-105		AB-515		Contrast
B	Shaft		Not Req.	Not Req.		AK-1		Attach to R6A
R7A	250KΩ	1	153-0007	QU-130	A47-250K-S	AB-50	SU-46	Horiz. Range
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Not Req.	Attach to R7A
R8A	50KΩ	1	153-0042	QU-123	A47-50K-S	AB-31	U-35	Horiz. Hold
B	Shaft		Not Req.	Not Req.	FKS-3	AK-4	Not Req.	Attach to R8A

* CONCENTRIKIT EQUIVALENT: KIT K-4, BASE ELEMENTS & SHAFTS: BU-137 & PI-314 (PANEL)
BU-137 & RI4-409 (REAR)
78-1 SWITCH

RESISTORS

ITEM No	RATING OHMS	RATING WATT	SYLVANIA PART No	IRC PART No.	NOTES
R9	10KΩ	1		BTS-10K	
R10	4700Ω	1		BTS-4700	
R11	22KΩ	1		BTS-22K	
R12	2.2Meg	1		BTS-2.2Meg	
R13	120KΩ	1		BTS-120K	
R14	470Ω	1		BTS-470	
R15	1.8Meg	1		BTS-1.8Meg	
R16	180Ω	1		BTS-180	
R17	470Ω	1		BTS-470	
R18	3300Ω	1		BTS-3300	
R19	56KΩ	1		BTS-56K	
R20	10KΩ	1		BTS-10K	
R21	1200Ω	1		BTS-1200	
R22	8200Ω	1		BTS-8200	
R23	820Ω	1		BTS-820	
R24	4700Ω	1		BTS-4700	
R25	2700Ω	2	183-0272	BTS-2700	
R26	47KΩ	1	181-0473	BTS-47K	
R27	6.2Meg	1	181-06255	BTS-6.2Meg	
		5%			
R28	390KΩ 5%	1	181-03945	BTS-390K 5%	
R29	100Ω	1	181-0101	BTS-100	

RESISTORS (cont)

ITEM No.	RATING OHMS	RATING WATT	SYLVANIA PART No.	IRC PART No.	NOTES
R30	120KΩ 5%	1	181-01245	BTS-120K 5%	
R31	100Ω	1	181-0101	BTS-100	
R32	33KΩ 5%	1	181-03325	BTS-33K 5%	
R33	270Ω	1	181-0271	BTS-270	
R34	470 5%	1	181-04705	BTS-47 5%	
R35	680Ω	1	181-0682	BTS-680	
R36	100Ω	1	181-0102	BTS-1000	
R37	2700Ω	1	181-0272	BTS-2700	
R38	100Ω	1	181-0101	BTS-100	
R39	470 5%	1	181-04705	BTS-47 5%	
R40	680Ω	1	181-0682	BTS-6800	
R41	100Ω	1	181-0102	BTS-1000	
R42	1500Ω	1	181-0152	BTS-1500	
R43	180Ω	1	181-0181	BTS-180	
R44	1000Ω	1	181-0103	BTS-1000	
R45	1000Ω	1	181-0102	BTS-1000	
R46	1000Ω	1	181-0122	BTS-1300	
R47	330Ω	1	181-0331	BTS-330	
R48	1000Ω	1	181-0102	BTS-1000	
R49	10KΩ	1	181-0103	BTS-10K	
R50	1000Ω	1	181-0102	BTS-1000	
R51	153Ω	1	181-0153	BTS-15K	Note 1
R52	2700Ω	1	181-0272	BTS-2700	
R53	6800Ω	1	181-0682	BTS-6800	
R54	8200Ω	2	183-0822	BTS-8200	
R55	6800Ω	2	183-0682	BTS-6800	
R56	330KΩ	1	181-0334	BTS-330K	
R57	3.3Meg	1	181-0335	BTS-3.3Meg	
R58	470KΩ	1	181-0474	BTS-470K	
R59	470KΩ	1	181-0474	BTS-470K	
R60	10KΩ	1	181-0103	BTS-10K	
R61	270KΩ	1		BTS-270K	Note 1
R62	6.8Meg	1	181-0685	BTS-6.8Meg	
		5%		5%	
R63	330KΩ 5%	1	181-0334	BTS-330K 5%	
R64	330KΩ 5%	1	181-0334	BTS-330K 5%	
R65	330Ω	1	181-0331	BTS-330	
R66	82KΩ	1	181-0823	BTS-82K	
R67	1000Ω	1	181-0102	BTS-1000	
R68	330Ω	1	181-0331	BTS-330	
R69	100KΩ	1	#190-0019	BTS-100K	
R70	100KΩ	1	181-0104	BTS-100K	
R71	22KΩ	1	181-0223	BTS-22K	
R72	68KΩ	1	181-0683	BTS-68K	
R73	153Meg	1	181-0156	BTS-153Meg	
R74	220KΩ	1	181-0224	BTS-330K	
R75	470KΩ	1	181-0474	BTS-470K	
R76	3401 5%	1	181-0391	BTA-390 5%	
R77	47Ω	1	181-0470	BTS-47	
R78	150Ω	1	181-0021		
R79	39KΩ	2	181-0393	BTS-39K	
R80	100KΩ	1	181-0104	BTS-100K	
R81	22Meg	1	181-0225	BTS-22Meg	

* Items R69, C66A, C66B and C66C are combined in one unit.
Note 1: Not used in some versions.

TRANSFORMER (POWER)

ITEM No.	RATING PRI	RATING SEC 1	RATING SEC 2	SYLVANIA PART No.	Halldorson PART No.	Merit PART No.	RCA TYPE No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117VAC	625VCT ⑤ 5.1A	5VAC ⑤ 3A	141-0042						
		.170ADC Tap ⑥ 206VCT .140ADC								
	SEC. 3	SEC. 4	SEC. 5							
	6.3VAC ⑤ .6A Tap ⑥ 5VAC ⑤ 3A	8.5VAC ⑤ 1.4A								

TRANSFORMER (HALOLIGHT)

ITEM No.	RATING PRI	RATING SEC 1	RATING SEC 2	SYLVANIA PART No.	Halldorson PART No.	Merit PART No.	RCA PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T2	117VAC	1000VAC .65A		141-0041		P-3065-L		24R43-L		

① Drill one new mounting hole.

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No.	USE	SYLVANIA PART No.	Halldorson PART No.	Merit PART No.	RCA TYPE No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T3	Horiz. Output Trans.	241-0015							
T4	Vert. Output Trans.	241-0018				V302D ⑫	A-8142K ⑫ ⑬	26872 ⑦	A-108X ⑦
T5A	Yoke(90°) Horiz.(L2430)	190-0015 ⑤	DF608 ⑤	MDF-51 ⑤	218D1 ⑤		DY-12A ⑤	Y-14 ⑤	Y-50-1 ⑤
B	Vert.(644DN)								
T6	Width Coil(.4-3.3MH)	152-0005		MWC-3 ⑨	208R1	2DR18A	WC-7	WC-23 ⑨	WC-13 ⑨

① Drill new mounting hole(s).
② Connect as auto transformer.
③ Includes capacitor C103, resistors R106, R107, R136.
④ Use original yoke damping network.
⑤ Connect horizontal damping network across terminals #3 and #7, use original network, if necessary.
⑥ Enlarge mounting hole.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI	IMPEDANCE SEC	SYLVANIA PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T7	5.6KΩ	3.6Ω	143-0033		Z1107	A-2930	A-3877	24851	S-3A

SPEAKER

ITEM No.	RATINGS SIZE	RATINGS FIELD	RATINGS V C IMP	SYLVANIA PART No	QUAM PART No	NOTES
SP1	10"	PM	3.6Ω	539-1006	10A31	

COILS (RF-IF)

ITEM No.	USE	DC RES PRI	DC RES SEC	SYLVANIA PART No	MEISSNER PART No	MERIT PART No	MILLER PART No	NOTES
L1	UHF Ant. Input Coil	0Ω						
L2	UHF Ant. Input Coil	0Ω						
L3	UHF Ant. Coil	0Ω						
L4	UHF Mixer Coil	0Ω						
L5	UHF Mixer Coupling Coil	0Ω						
L6	UHF Osc. Coupling Coil	0Ω						
L7	UHF Osc. Coil	0Ω						
L8	Fil. Choke	0Ω						
L9	Fil. Choke	0Ω						
L10	Cathode Choke	0Ω						
L11	RF Choke	0Ω						
L12	UHF IF Coil	0Ω						
L13	VHF Ant. Trans.	0Ω CT	0Ω					
L14	UHF IF Input	0Ω CT						
L15	VHF Ant. Coils	0Ω						Channel 13
L16	VHF Ant. Coil	0Ω						Channel 6
L17	VHF Ant. Coils	0Ω						
L18	VHF Ant. Coils	0Ω						
L19	Fil. Choke	0Ω						
L20	Heat. Coil	0Ω						
L21	VHF RF Coil	0Ω						Channel 13
L22	VHF RF Coils	0Ω						
L23	VHF RF Coil	0Ω						Channel 6
L24	UHF IF Coil	0Ω						
L25	VHF Mixer Grid Coil	0Ω						Channel 13
L26	VHF Mixer Grid Coils	0Ω						
L27	VHF Mixer Grid Coils	0Ω						Channel 6
L28	UHF IF Coil	0Ω						
L29	Fil. Choke	0Ω						
L30	VHF Osc. Coil	0Ω						Channel 13
L31	VHF Osc. Coils	0Ω						
L32	RF Coil	0Ω						
L33	Conv. Plate	0Ω	0Ω					
L34	Ist. Video IF	0Ω		115-0001				
L35	Video IF Coupling Coil	.1Ω		119-0008	17-4531 ⑥		6233 ■	Includes 39.75MC trap.
L36	2nd. Video IF	.1Ω	.1Ω	119-0003	17-5002	TV-127	6232	Includes 41.25MC trap
L37	Fil. Choke	0Ω		147-0014	19-2001	TV-189	4604	7 Microhenry
L38	3rd. Video IF	.2Ω	.1Ω	119-0004	17-5003	TV-128	6233	Includes 47.25MC trap
L39	4th. Video IF	.1Ω	.1Ω	119-0005	17-5003 ▲	TV-127 ▲	6234	
L40	Cathode Trap	0Ω	0Ω	126-0011	20-1045	TV-130	6219	
L41	5th. Video IF	.1Ω	.1Ω	126-0002	17-5000 ▲	TV-125 ▲	6234 ▲	
L42	Series Peaking Coil	1.6Ω		118-0010	19-1005		4612	
L43A	Series Peaking Coil	5.5Ω			19-3160	TV-184	4644	160 Microhenries
B	Shunt Peaking Coil	8Ω		131-2006	19-3300		6155	330 Microhenries
L44	4.5MC Trap	5.3Ω		130-0001	20-1005	TV-151	1670	
L45A	Series Peaking Coil	5.5Ω			19-3160	TV-184	4644	160 Microhenries
B	Shunt Peaking Coil	8.5Ω		131-2006	19-3300		6155	330 Microhenries
L46	Sound IF	2.5Ω	2.5Ω	120-0003	19-2445 ⑦	TV-113	6203	
L47	Ratio Det.	1Ω	1.4ΩCT	138-0008	17-3497	TV-115	6305	Tertiary winding-.9Ω
L48	Horiz. Sync Phase Trans.	3Ω	3Ω	143-0001				
L49	Horiz. Osc.	33Ω		132-0001	19-1075	TV-183 ▲	6310 ▲	
L50	RF Choke	1.4Ω		118-0010	19-1005		4613	9.6 Microhenries
L51	RF Choke	1.4Ω		118-0010	19-1005		4612	9.6 Microhenries

* Drill mounting holes and use secondary and trap windings.
■ Use secondary and trap windings.
▲ Detune trap.
= Use adaptor plate.
† Drill mounting holes.
◆ Enlarge mounting hole.

SYLVANIA MODELS 596B, BU, M, MU (Ch. 1-522-1, -2)

PARTS LIST AND DESCRIPTIONS (Continued)

FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA					
	TOTAL DIRECT CURRENT	D. C. RESISTANCE	INDUCTANCE (0 CURRENT 1000 ∿)	SYLVANIA PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
L52	.310ADC	38Ω	1.3HY	145-0009	C5037①		C-2326①	26C44①	

① Drill one new mounting hole.

FUSES

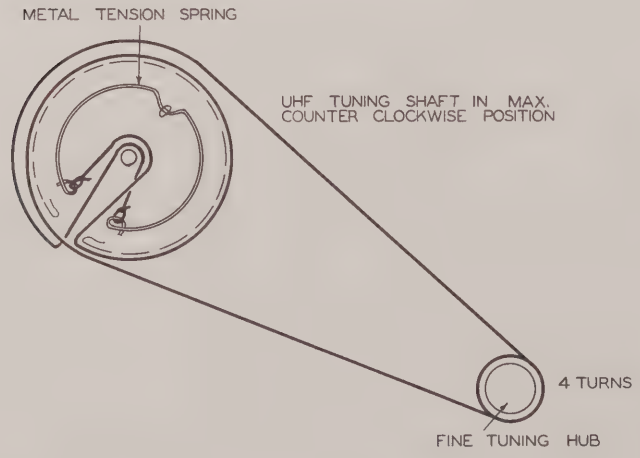
ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			SYLVANIA PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1	3AG S/B	4/10A 125V	191-0016		313.400 (3AG S/B-4/10A)	357001	MDL 4/10	4405

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA			NOTES
		SYLVANIA PART No.	SYLVANIA PART No.		
M2	1N82A	1N82A or 1N82	1N82A or 1N82		UHF Mixer

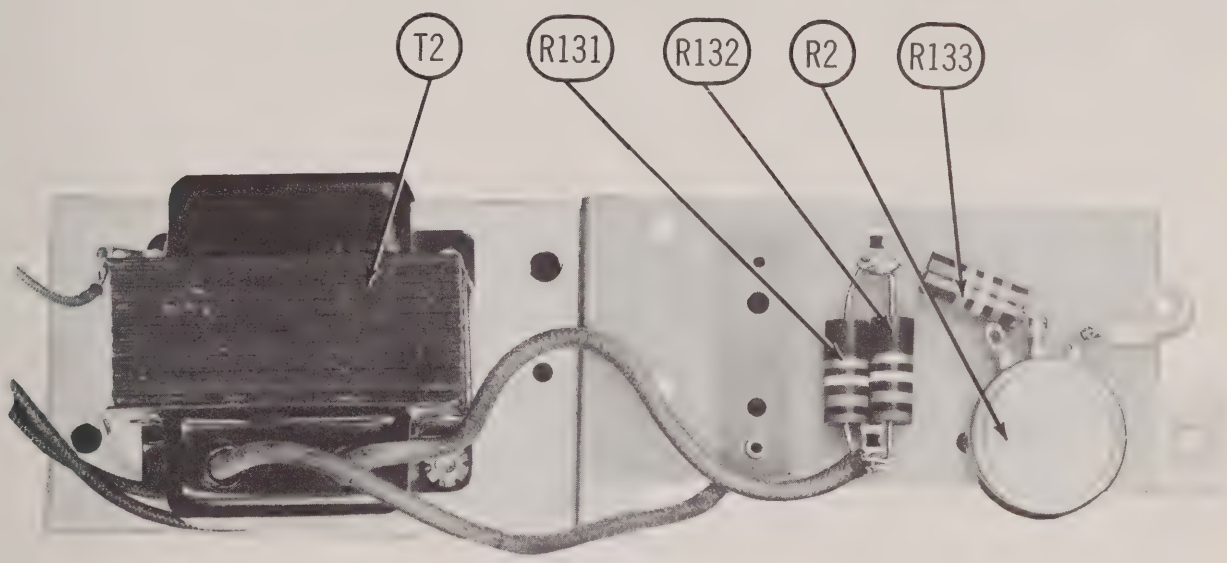
MISCELLANEOUS

ITEM No.	PART NAME	SYLVANIA PART No.	NOTES
M3	HaloLight	611-2401	
M4	Tuner	323-0050	VHF
M5	Tuner	323-0051	UHF- Ch. 1-522-2 only
M6	Trap	32-86649-1	VHF Ant. input filter
M7	Focus Magnet	400-0021	Includes centering device
M8	Ion Trap	400-0013	
M9	Correction Magnet	400-0016	
M10	Correction Magnet	400-0016	
M11	Correction Magnet	400-0016	
M12	Correction Magnet	400-0016	
	Knob	740-0060	Brightness
	Knob	741-0006	Channel Selector
	Knob	740-0062	Fine tuning and on-off-volume
	Knob	740-0045	HaloLight Control
	Dial	722-0036	VHF channels (Models 596B, 596M)
	Dial	722-0035	VHF and UHF channels (Models 596BU, 596MU)

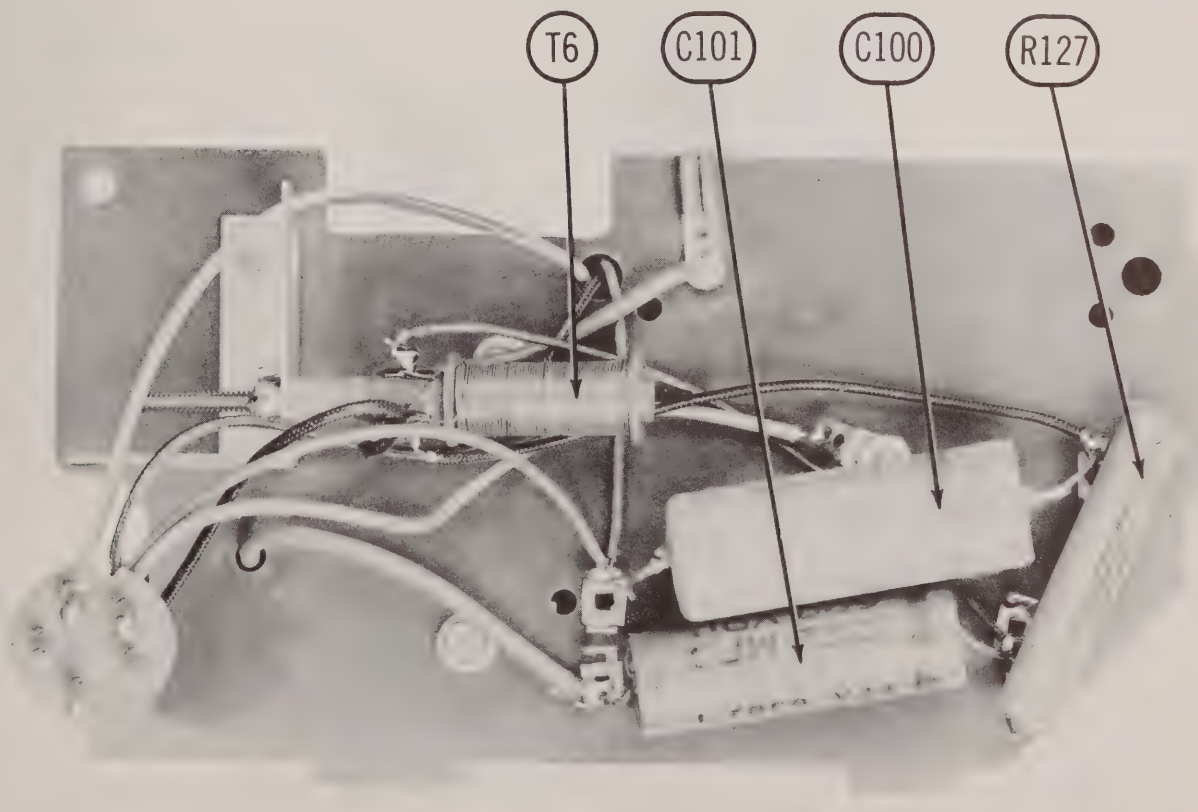


UHF DRIVE CORD STRINGING

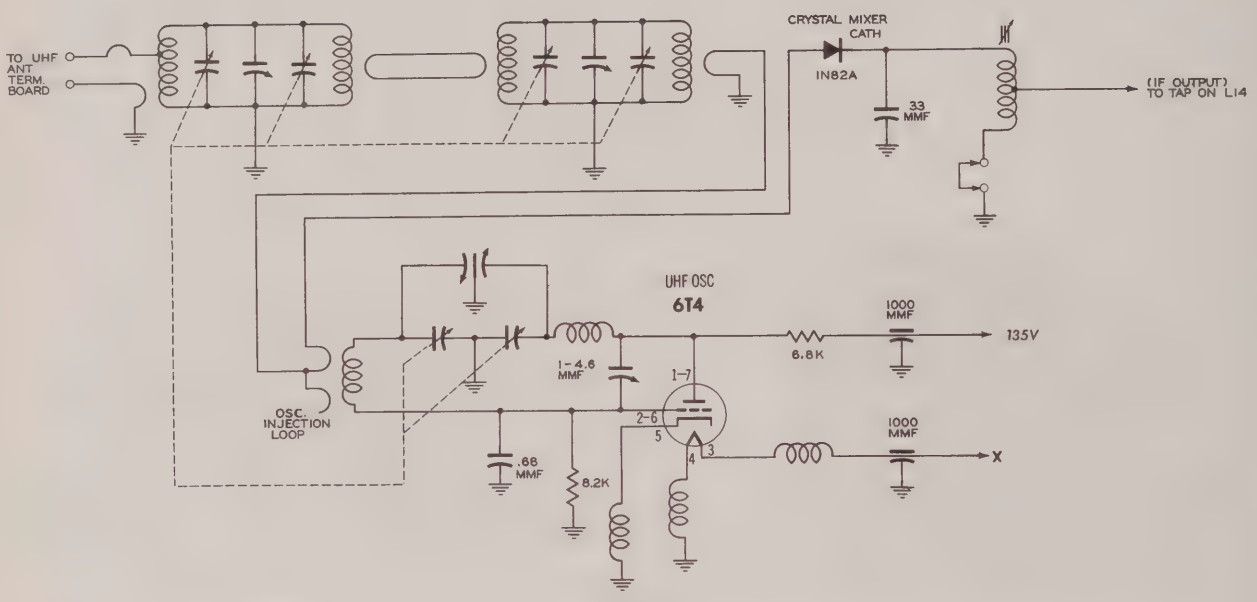
PROPERTY OF
IKENSHIP
MEADE ST.
COLORADO



HALOLIGHT CONTROL UNIT



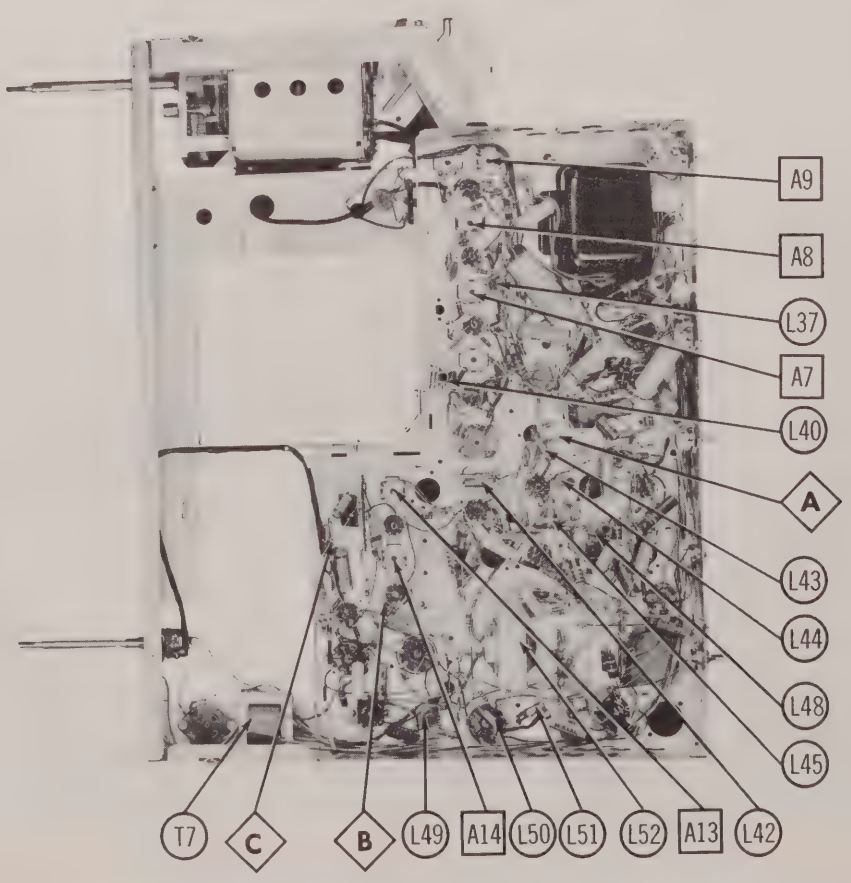
HIGH VOLTAGE SUB-CHASSIS BOTTOM VIEW



ALTERNATE UHF TUNER USED WITH SOME VERSIONS

A PHOTOFACT STANDARD NOTATION SCHEMATIC
© Howard W. Sams & Co., Inc. 1955

ALTERNATE UHF TUNER SCHEMATIC



CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENTIFICATION

TROUBLE SHOOTING AIDS (cont)

PROPERTY OF
L. F. BLANKENSHIP
5324 MEADE ST.
DENVER, COLORADO

HIGH VOLTAGE

LOSS OF HIGH VOLTAGE

Check by substitution V19, V20, V21 and V22. Check MI fuse. Check waveform W18.

If Satisfactory	If Unsatisfactory
Check T3, T5A, C102, T6, C100, C101, R125 and other associated components.	Check L49, C93, C94, C96, R117, R116, R114, R118 and other associated components.

INSUFFICIENT HIGH VOLTAGE

Check by substitution V20, V21, V23 and V24. Check adjustment B2. Check C95, C96, C5, R125, R119 and other associated components.

BLOOMING

Check by substitution V20, V21, V22, V23 and V24. Check C96, C102, R125 and other associated components.

GENERAL

RASTER, SOUND, NO PICTURE

Follow procedure outlined under "Loss of Video".

RASTER, PICTURE, NO SOUND

Follow procedure outlined under "Weak or No Sound".

RASTER, NO SOUND, NO PICTURE

Check by substitution V2, V3, V4, V5, V6, V7 and V8. Check video IF components for failure or change of value. Raster, No Sound, No picture UHF, substitute V1.

NO RASTER, NO SOUND

Follow procedure outlined under "Dead Set".

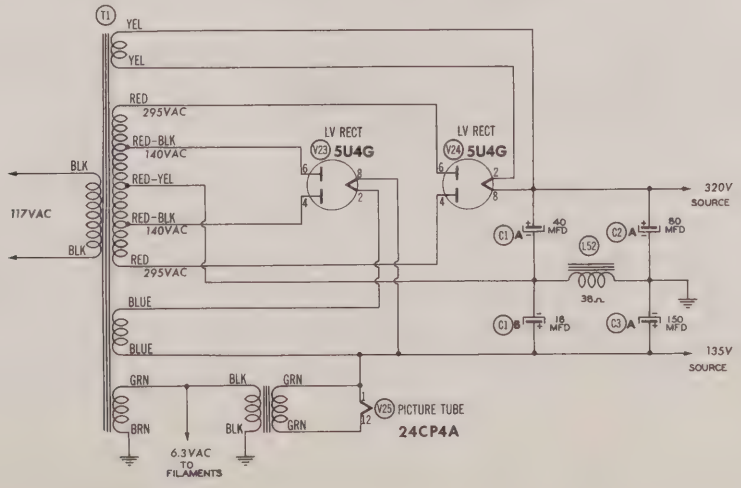
KEYSTONE EFFECT

Check T5 and its associated components.

INTERMITTENT STREAKS

Check high voltage section for corona discharge and arcing.

Symptoms shown are assumed and are not indicative of the quality and workmanship of this equipment.

Ch. 1-522-1,C01 1-522-2,C02	The following changes were made in late production. Whenever possible the reason for the change is also given. TO IMPROVE OPERATION OF THE ATC CIRCUIT R62 was changed from 6.8Meg, 10% to 6.8Meg, 5%. R63 was changed from 330KΩ, 10% to 330KΩ, 5%. R64 was changed from 330KΩ, 10% to 330KΩ, 5%. TO INCREASE VIDEO OUTPUT R61, 270KΩ resistor added and connected as shown on the schematic.	
Ch.1-522-1,C02 1-522-2,C02	FACTORY CHANGE T1, power transformer, changed to part #141-0038. A partial schematic is given below showing the new circuit. A filament transformer is added (part #141-0053). See partial schematic below. R122 is decreased from 68Ω to 56Ω. R124 is increased from 180Ω to 220Ω. R61 (added in C01 change) is now decreased from 270KΩ to 180KΩ.	
Ch.1-522-1,C03 1-522-2,C03	TO ELIMINATE POSSIBLE DRIVE LINES With the power transformer (T1) changed to part #141-0038, R119 is increased from 5.6KΩ. to 8.2KΩ to eliminate the possibility of horizontal drive lines.	
		

SYLVANIA MODELS 596B, BU, M, MU (Ch. 1-522-1, -2)

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustments of the VHF tuner oscillator circuit may be accomplished by removal of the channel selector and fine tuning knobs. The adjustments are accessible, one at a time, thru the small hole in the cabinet above and slightly to the left of the channel selector shaft.

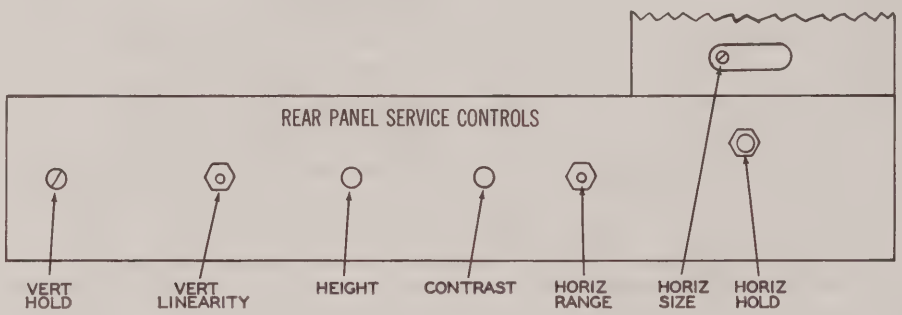
PICTURE TUBE SAFETY GLASS CLEANING

For picture tube safety glass cleaning, it is necessary to remove chassis. (See disassembly instructions).

PICTURE TUBE REMOVAL

For picture tube removal it is necessary to remove chassis.(See disassembly instructions).

SERVICE ADJUSTMENT LOCATION



HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

Adjustment of the horizontal oscillator circuit may be made from rear panel of the chassis. Set the horizontal hold control at its mid-range position. Adjust the horizontal range control until picture synchronizes horizontally. If unable to lock picture in sync refer to "Horizontal Sweep Circuit Adjustments".

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate sound IF detector buzz adjust the ratio detector secondary (L47) located on the top of chassis. (See tube placement chart).

FUSES

One fuse is used for horizontal sweep circuit protection. (For location see tube placement chart).

CENTERING

Centering is accomplished mechanically by means of a centering lever on the PM focusing assembly. Adjust the centering lever from side to side, and up and down until the picture is properly centered.

ANTI-PIN CUSHION ADJUSTMENT

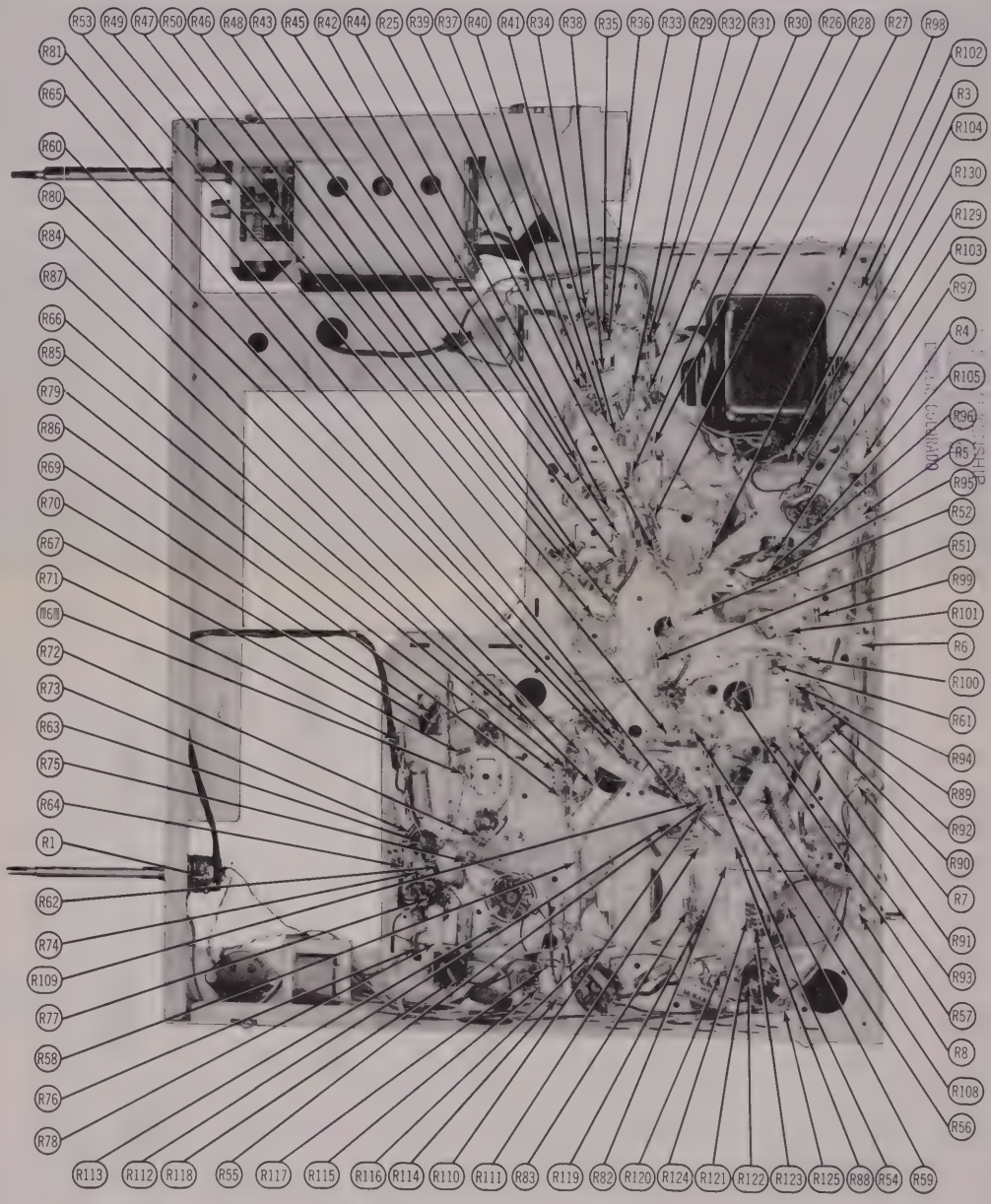
Reduce the picture size so that the sides of the raster are visible, and position the magnets so that all sides are straight lines and the corners are at right angles.

DISASSEMBLY INSTRUCTIONS

1. Remove 3 push-on type control knobs (on-off-volume, brightness and fine tuning).
2. Loosen 1 metal screw (located inside channel selector knob).
3. Remove channel selector knob.
4. Remove 7 wood screws. Remove rear cover.
5. Disconnect picture tube socket, 2 deflection yoke sockets, HV lead, speaker plug and HaloLight plug.
6. Remove 1 metal screw from HV lead stand-off insulator.
7. Remove 1 metal screw from picture tube mounting ground strap.
8. Remove 4 chassis bolts. Remove chassis.
9. Remove 4 speaker nuts. Remove speaker.

HALO LIGHT CONTROL UNIT REMOVAL

1. Remove chassis.
2. Disconnect HaloLight plug from HaloLight control unit.
3. Remove 3 metal screws from HaloLight control unit.
4. Remove HaloLight control unit.



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

WESTINGHOUSE MODELS H-434T5, H-435T5, H-436T5, H-437T5, H-438T5 (Ch. V-2189-2)

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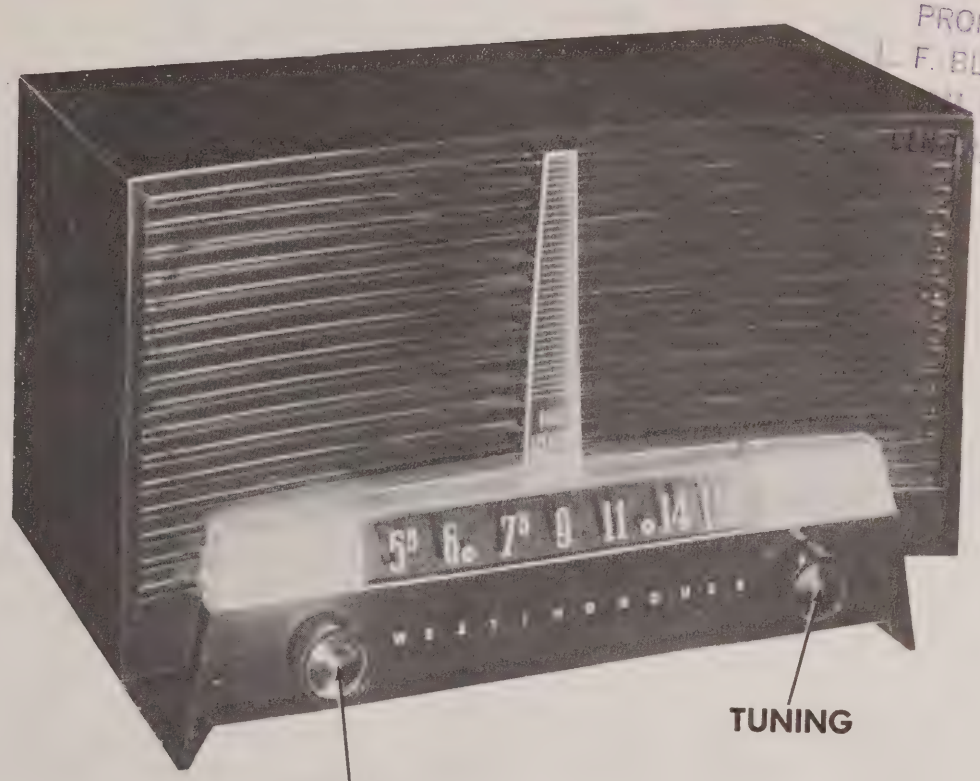
WESTINGHOUSE MODELS H-434T5, H-435T5, H-436T5, H-437T5, H-438T5 (Ch. V-2189-2)



WESTINGHOUSE MODELS H-434T5, H-435T5, H-436T5, H-437T5, H-438T5 (Ch. V-2189-2)

TRADE NAME	Westinghouse Models H-434T5, H-435T5, H-436T5, H-437T5, H-438T5 (Ch. V-2189-2)
MANUFACTURER	Westinghouse Electric Corp., TV-Radio Div., Metuchen, N.J.
TYPE SET	AC-DC Operated AM Superheterodyne Receiver
TUBES (Five)	Types 12BE6 Conv., 12BA6 IF Amp., 12AV6 Det.-AVC-AF Amp., 50C5 Output, 35W4 Rectifier
POWER SUPPLY	105-120 Volts AC-DC — RATING .25 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST	540KC-1600KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
Loop should be maintained in same relative position to chassis as when receiver is in cabinet.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	200MMF	High side to ant. terminal lug on tuning gang. Low side to chassis.	455KC (400~Mod)	Tuning gang fully open	Across voice coil	A1, A2, A3, A4	Adjust for maximum output.
2.	"	"	1625KC	"	"	A5	"
3.		Loop (Radiated)	1400KC	1400KC	"	A6	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.

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PARTS LIST AND DESCRIPTIONS

WESTINGHOUSE
MODEL H-434T5 (Ch. V-2189-2)

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		Westinghouse PART No.	STANDARD REPLACEMENT		
V1	Converter	12BE6	12BE6	7CH	
V2	IF Amplifier	12BA6	12BA6	7BK	
V3	Det.-AVC-AF Amp.	12AV6	12AV6	7BT	
V4	Audio Output	50C5	50C5	7CV	
V5	Rectifier	35W4	35W4	5BQ	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT	Westinghouse PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1A	50	150	V-12287-2			TCD49	TDL-D50-150	FMD-1550	
B	50	150							
C2	10000								Note 1
C3A	220								
B	5000								
C	5000		♦V-10789-2	♦PC-151	♦1408-02				
D	250								
E									
C4	.01	400	R2CC63Z5Z103P	D6-103	GP2-333-103	PT411	IMP4-S1	330411	
C5	10000		RCP10W4103M	DD-103	811-01	DC-511	IMP6-S1	330611	
C6	.047	400	V-10157-4473M	DF-503		PT4147	IMP4-S47	3304147	
C7	.05	400	RCP10W4503M	DF-503		PT415	IMP4-S5	330415	

Note 1. Some versions use .05MFD in this application (part #RCP10W2503M).
♦ Items C3A, C3B, C3C, C3E, R7A, R7B, R7C are combined in one unit.
When replacing items separately, C3D and C3E should total 250MMF.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	Westinghouse PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R1A	500KΩ	½	V-9993-12	Q19-133X	A47F2-500K		UT-431	Volume - tapped @ 200KΩ
B	Shaft		Not Req.	Not Req.	FS-3		Not Req.	Attach to R1A
C	Switch		Not Req.	76-1	SWE-12		US-26	Attach to R1A

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	Westinghouse PART No.	IRC PART No.	
R2	22KΩ	½	RC20AE223M	BTS-22K	
R3	68Ω	½	RC20AE680M	BTS-68	
R4	3.3Meg	½	RC20AE335M	BTS-3.3Meg	
R5	47KΩ	½	RC20AE473M	BTS-47K	
R6	22KΩ	½	RC20AE223M	BTS-22K	

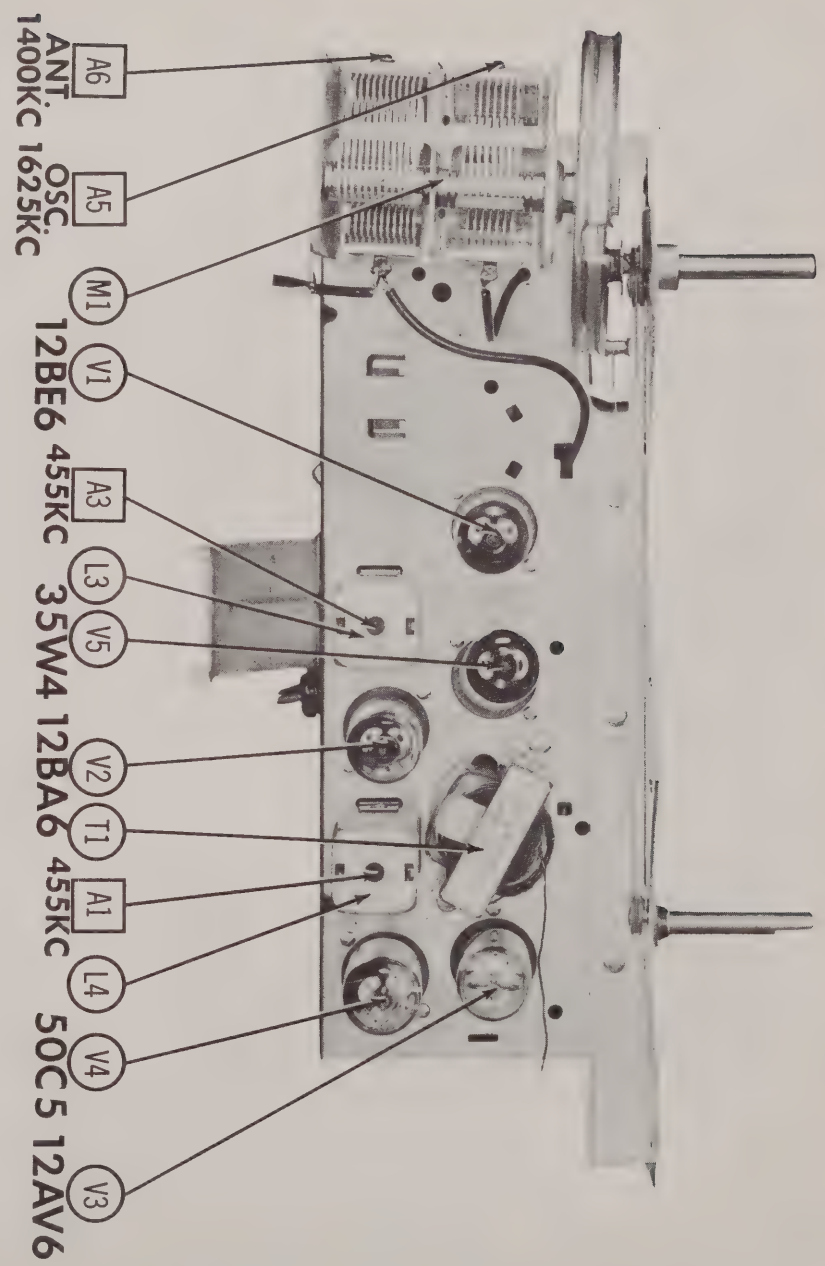
ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	Westinghouse PART No.	IRC PART No.	
R7A	6.8Meg	½		BTS-6.8Meg	
B	470KΩ	½	♦V10789-2	BTS-470K	
C	470KΩ	½		BTS-470K	
R8	150Ω	½	RC20AE151M	BTS-150	
R9	1000Ω	1	RC30AE102M	BTA-1000	

♦ Items R7A, R7B, R7C, C3A, C3B, C3C, C3D and C3E are combined in one unit.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	Westinghouse PART No.	Stancor PART No.	Merit PART No.	Triad PART No.	Halldorson PART No.	Thordarson PART No.	
T1	2.4KΩ	3.2Ω	V-14199B-1	A-3332	A-3025	S-12X	ZL101	26S58	

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA			NOTES
	SIZE	FIELD	V. C. IMP.	Westinghouse PART No.	JENSEN PART No.	QUAM PART No.	
SP1	4"	PM	3.2Ω	V-11554-1	ST-113 Mod. P4-X	4A07	
SP2	4"	PM	3.2Ω	V-11554-1	ST-113 Mod. P4-X	4A07	

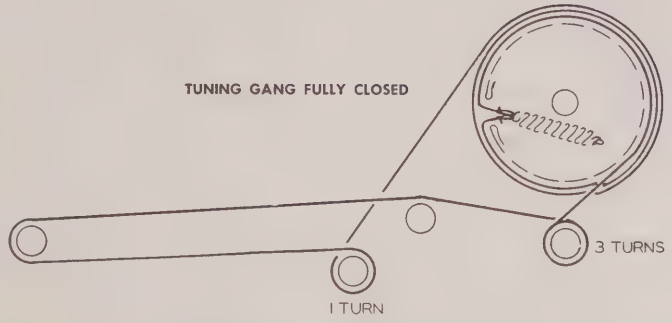
COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	Westinghouse PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Loop Ant.	3.5Ω		V-14186-1				Includes cabinet back
L2	Osc. Coil	1Ω	12Ω	V-14408-2 †	14-1073 *		69-OSC■	
L3	Input IF	17Ω	17Ω	V-10945-1	16-6758	BC-352	12-C1	
L4	Output IF	17Ω	17Ω	V-10945-1	16-6758	BC-353	12-C2	

* Leads sufficient mounting support.
■ Drill mounting hole.
† Includes R2 and C2.

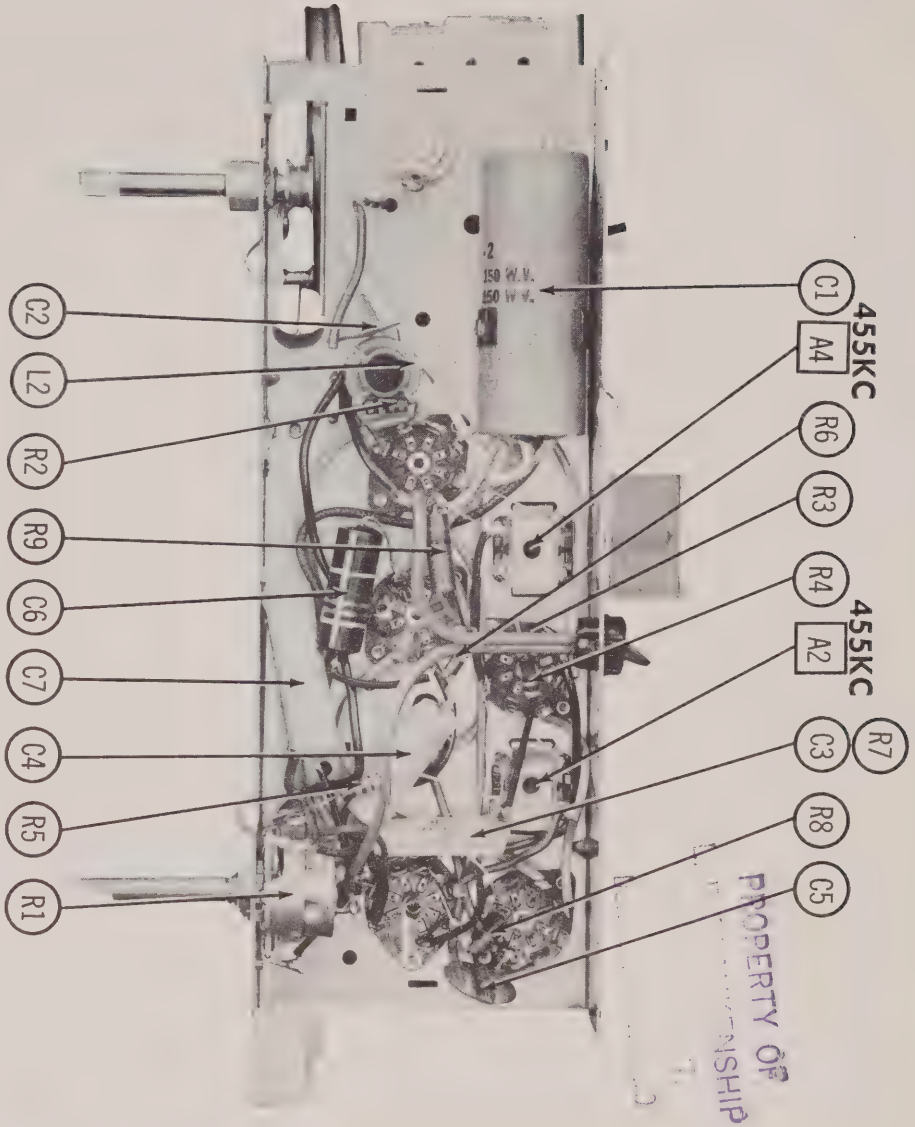
MISCELLANEOUS

ITEM No.	PART NAME	Westinghouse PART No.	NOTES
M1	Tuning Cap.	V-14184-1	2 Gang (19-375MMF, 14-105MMF)
	Cabinet	V-1357-5	Model H-434T5
	Cabinet	V-1357-1	Model H-435T5
	Cabinet	V-1357-6	Model H-436T5
	Cabinet	V-1357-7	Model H-437T5
	Cabinet	V-1357-8	Model H-438T5
	Knob	V-10408-15	On-off-volume and tuning - Model H-434T5
	Knob	V-10408-12	On-off-volume and tuning - Model H-435T5
	Knob	V-10408-16	On-off-volume and tuning - Model H-436T5
	Knob	V-10408-17	On-off-volume and tuning - Model H-437T5
	Knob	V-10408-18	On-off-volume and tuning - Model H-438T5
	Pointer	V-14227-1	Dial



DIAL CORD STRINGING

CHASSIS—BOTTOM VIEW



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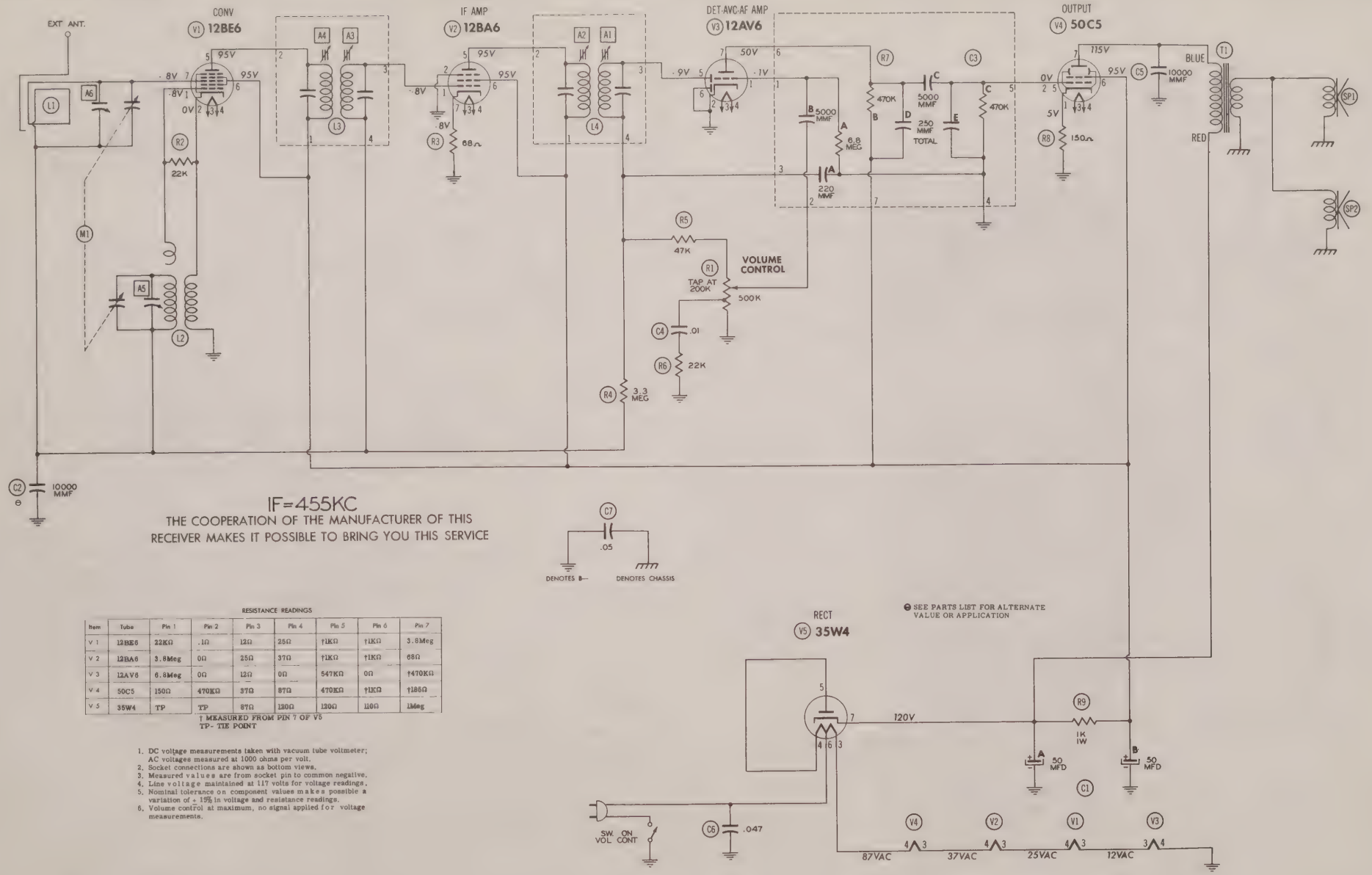

IF=455KC

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RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	12BE6	22KΩ	.1Ω	12Ω	25Ω	†1KΩ	†1KΩ	3.8Meg
V 2	12BA6	3.8Meg	0Ω	25Ω	37Ω	†1KΩ	†1KΩ	68Ω
V 3	12AV6	6.8Meg	0Ω	12Ω	0Ω	547KΩ	0Ω	†470KΩ
V 4	50C5	150Ω	470KΩ	37Ω	87Ω	470KΩ	†1KΩ	†186Ω
V 5	35W4	TP	TP	87Ω	120Ω	120Ω	110Ω	1Meg

† MEASURED FROM PIN 7 OF V5
TP- TIE POINT

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

⊖ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

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MODEL H-867T21B

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WESTINGHOUSE MODEL H-867T21B

TRADE NAME	Westinghouse	MODELS	CHASSIS
		H-799T17, H-799T17B	V-2310
		H-799TU17, H-799TU17B	V-2320
		H-867T21, H-867T21B, H-868T21, H-879T21(S), H-879T21(V), H-880T21(S), H-880T21(V).	V-2312
		H-867TU21, H-867TU21B, H-868TU21, H-879TU21, H-880TU21	V-2322
MANUFACTURER	Westinghouse Electric Corp., Television & Radio Div., Metuchen, N. J.		
TYPE SET	Television Receiver		
TUBES	Eighteen		
POWER SUPPLY	110-120 Volts AC - 60 Cycle	RATING 1.46 Amp. @ 117 Volts AC	
TUNING RANGE	Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)		

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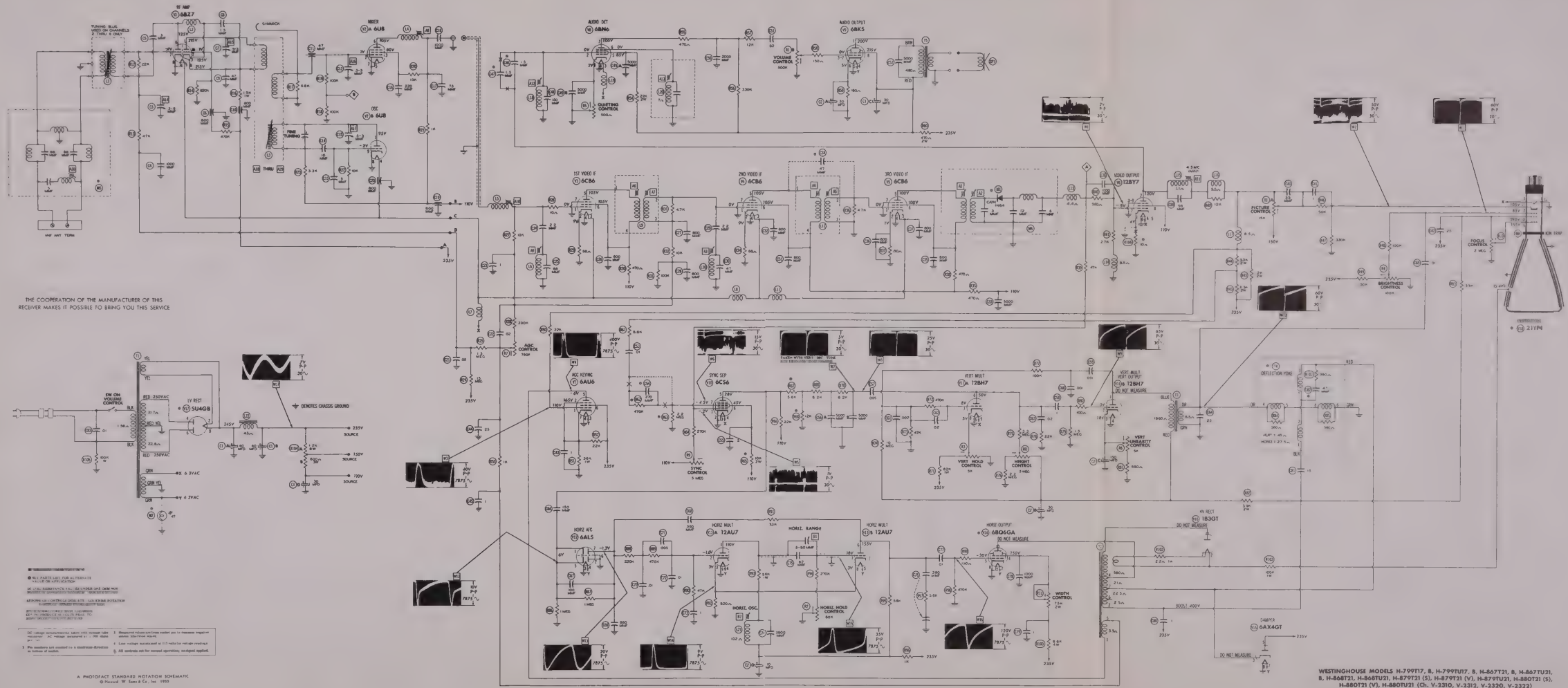
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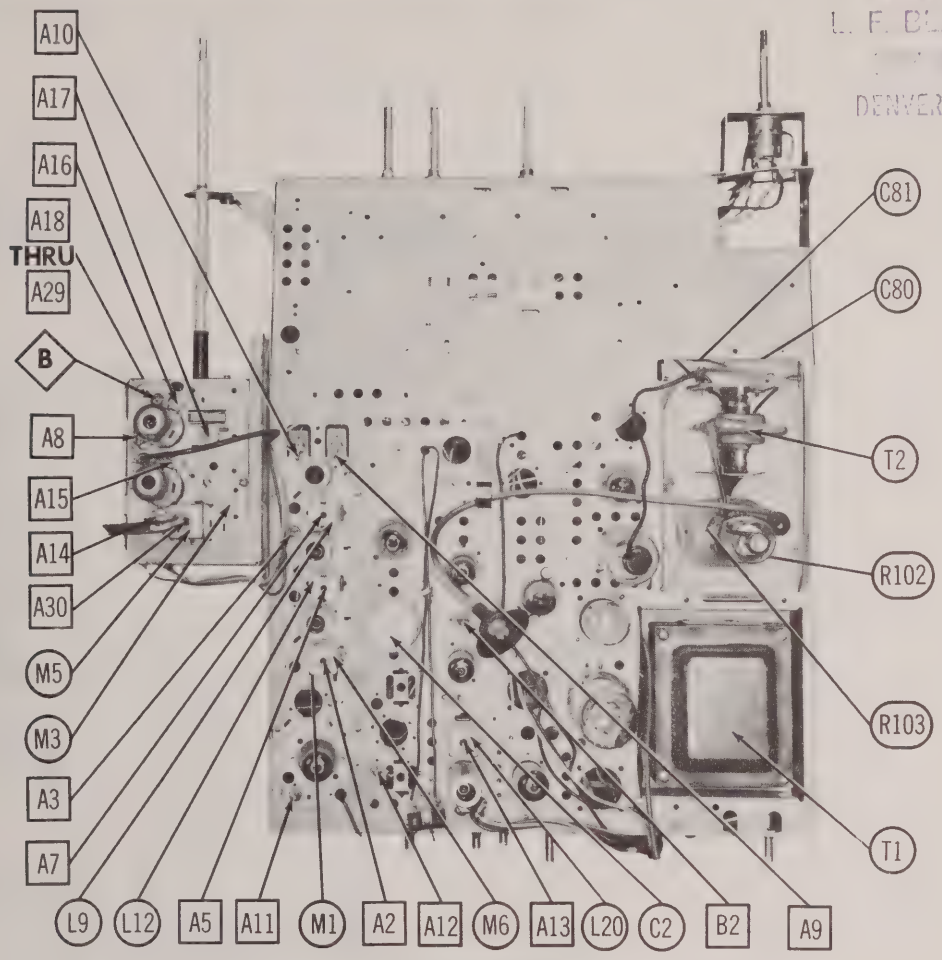
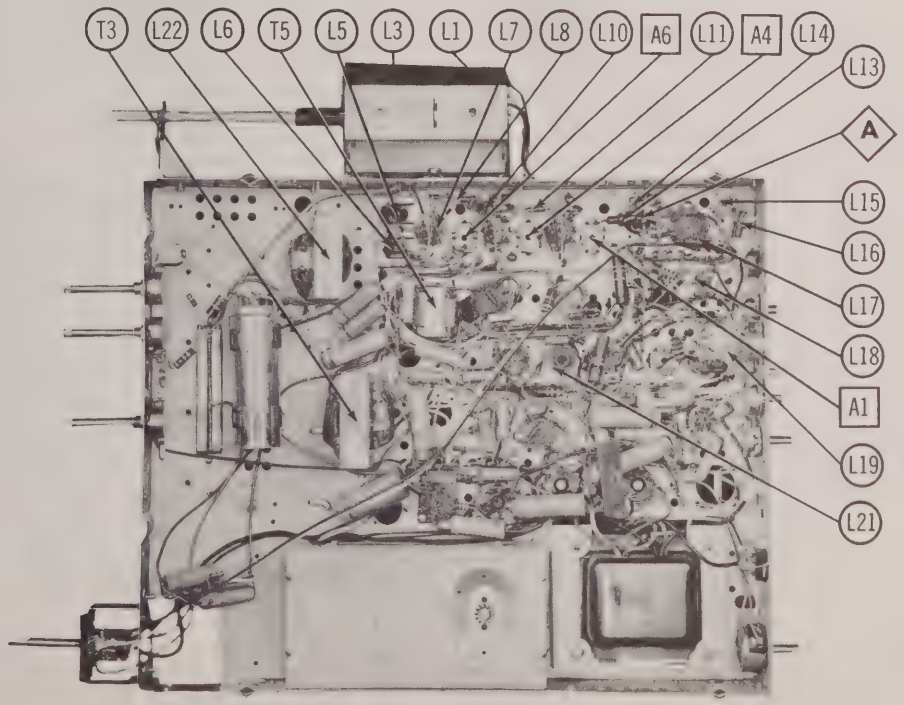


CHASSIS TOP VIEW



CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENTIFICATION

SET 281 FOLDER 10

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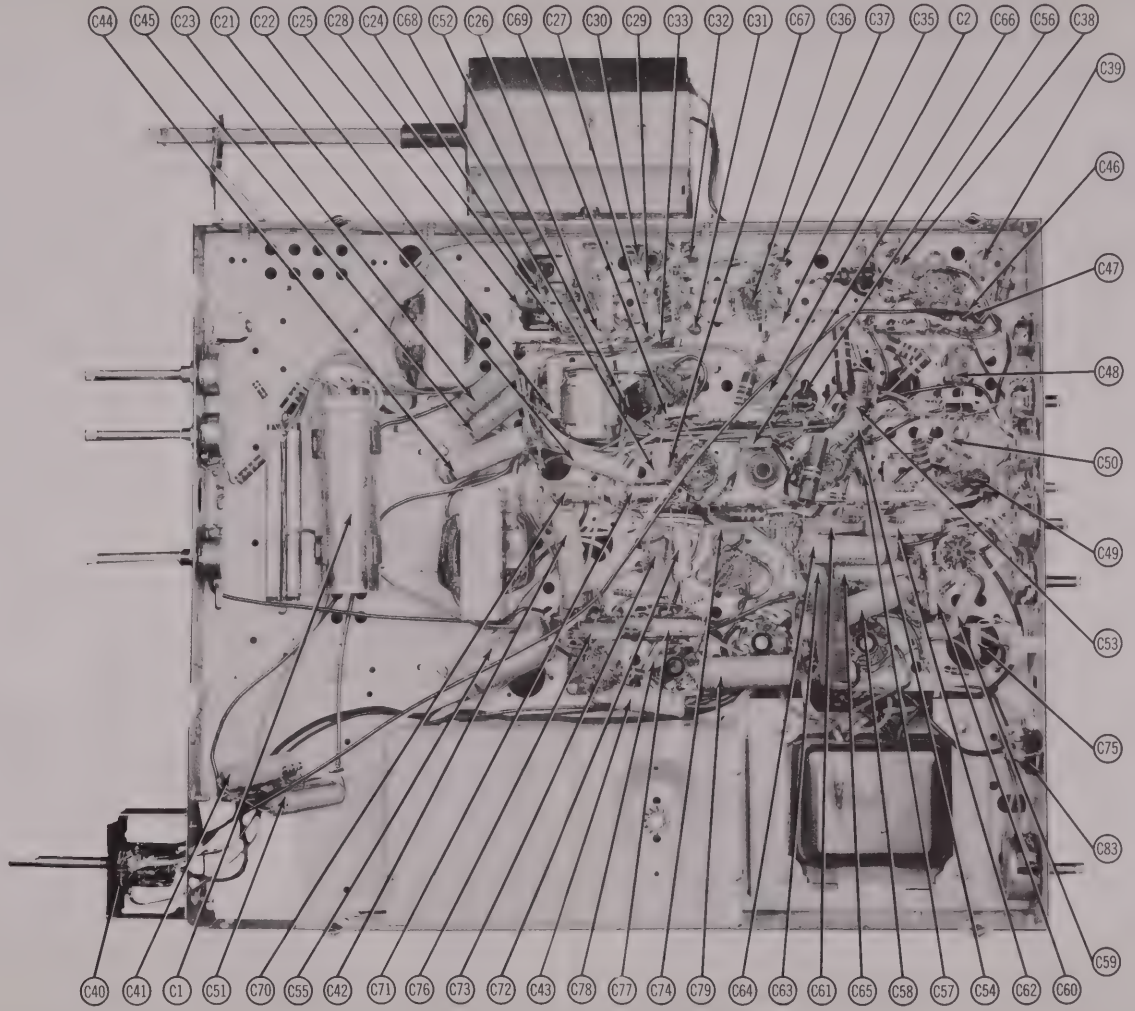

CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

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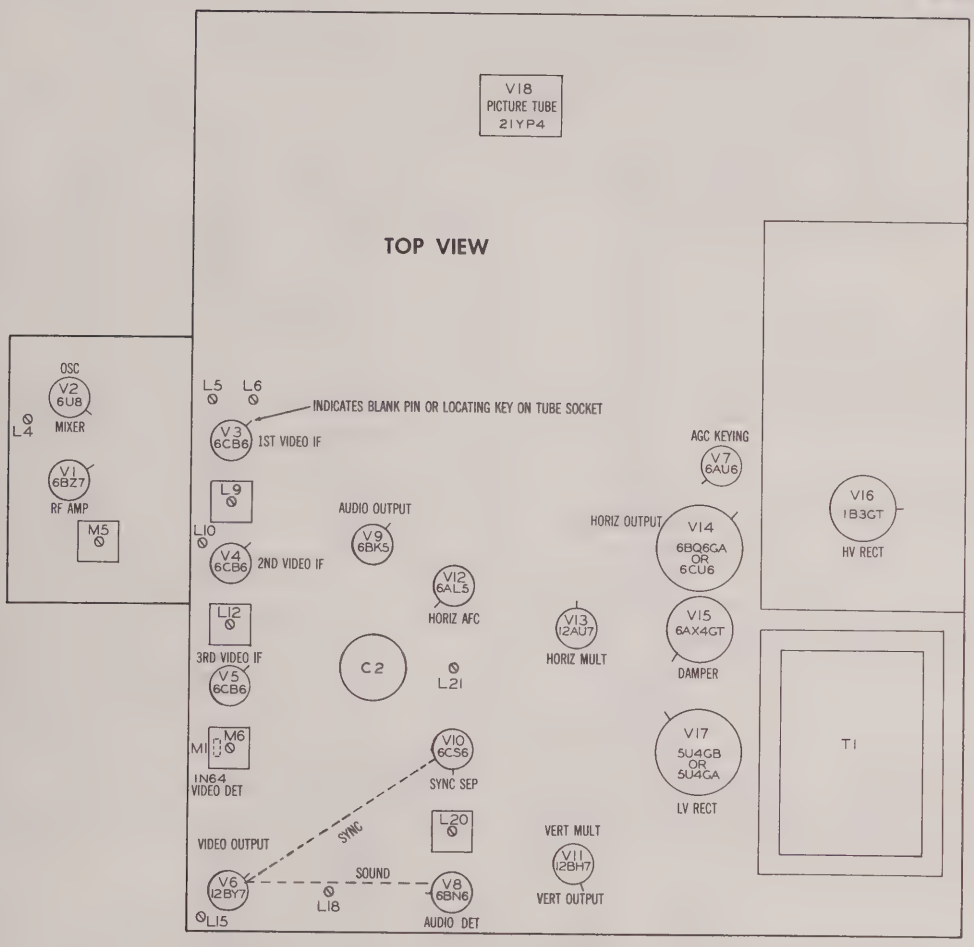
TUBE PLACEMENT CHART



TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound - V17

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - V2, V3, V4, V5, V6
No pic, no sound, has snow - V1, V2, V3
No pic, has sound, has raster - V6, V7, V18
Has pic, no sound - V8, V9
Overloaded picture - V7

SYNC FAILURE
No vert. sync - V10, V11
No horiz. sync - V10, V12, V13
No vert. or horiz. sync - V10

SWEEP FAILURE
No raster, has sound - V13, V14, V15, V16, V18
No vertical deflection - V11
Poor vert. linearity or foldover - V11
Poor horiz. linearity or foldover - V13, V14, V15
Narrow picture - V13, V14, V15, V16, V17
Vert. off freq. - V10, V11
Horiz. off freq. - V10, V12, V13

WESTINGHOUSE MODELS H-799T17, B, H-799TU17, B, H-867T21, B, H-867TU21, B, H-868T21, H-868TU21, H-879T21 (S), H-879T21 (V), H-879TU21, H-880T21 (S), H-880T21 (V), H-880TU21 (Ch. V-2310, V-2312, V-2320, V-2322)

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

The high voltage lead should be securely taped and kept away from chassis. Do not remove the horizontal multivibrator tube (V13) to disable the high voltage.

VIDEO IF ALIGNMENT

Remove V1 (6BZ7) from its socket to minimize the possibility of undesirable beat response during alignment.
Connect the negative lead of a 9 volt bias supply to the ungrounded side of C44. Connect the positive lead of chassis.
Connect a 470MMF capacitor across the vertical input terminals of scope.
If a separate marker is used couple its output loosely to the sweep generator output cable.
If peaks appear at two different slug settings, use the one at furthest counter clockwise position.
Use high scope gain and only enough sweep generator output to provide usable pattern on scope.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	Direct	High side to pin 1 (grid) of 6CB6 (V5). Low side to chassis near V5.	44MC (10MC Swp)	42.25MC 43.0MC 44.0MC 45.0MC 45.75MC	13	Vert. Amp. thru 47KΩ to point (A). Low side to chassis.	A1, A2	Attach detuning clips (use alligator clips) to pin 5 (plate) of V3 and V4. Adjust A1 for maximum gain at 44MC. Adjust A2 for symmetrical response with markers as shown in Fig. 1. Remove detuning clips from pin 5 of V3 and V4.
2.	"	High side to pin 1 (grid) of 6CB6 (V3). Low side to chassis near V3.	Not used	47.25MC (400∿Mod)	"	"	A3	Adjust for minimum 400∿ indication on scope.
3.	"	High side to pin 1 (grid) of 6CB6 (V4). Low side to chassis near V4.	44MC (10MC Swp)	42.25MC 43.0MC 44.0MC 45.0MC 45.75MC	"	"	A4, A5	Attach detuning clip to pin 5 (plate) of V3. Adjust A4 for maximum gain at 44MC. Adjust A5 for symmetrical response with markers as shown in Fig. 2. Remove detuning clip for pin 5 of V3.
4.	"	High side to pin 1 (grid) of V3. Low side to chassis near V3.	"	41.25MC 42.25MC 43.0MC 44.0MC 45.0MC 45.75MC 47.25MC	"	"	A6, A7, A8	Detune A8 (on tuner) several turns counter clockwise. Adjust A6 for maximum response at 44MC. Adjust A7 for symmetrical response with markers as shown in Fig. 3. Adjust A8 so that dip it produces on response is centered at 44MC. Replace RF amplifier tube (V1) in its socket.
5.	Fig. 5	Thru matching network (Fig. 5) across antenna terminals.	213MC (10MC Swp)	213MC 209.75MC 211.25MC 212.0MC 214.0MC 214.75MC 215.75MC 41.25MC	"	"	A9, A10	Set the fine tuning control to its mid-range position. Clip the high side of the marker generator to the converter (V2) tube shield (leave low side disconnected). Adjust A10 for symmetrical response as shown in Fig. 4. Adjust A9 for minimum marker amplitude at 41.25MC.

4.5MC TRAP ALIGNMENT

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
6.	.001MFD	High side to point (A). Low side to chassis.	Not used	4.5MC (Unmod)	Any unused channel	Use VTVM. DC probe thru detector probe (Fig. 6) to pin 11 (cathode) of picture tube. Common to chassis.	A11	Adjust for minimum deflection.

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60∿ modulation and 450KC sweep. Use 120∿ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
7.	.001MFD	High side to point (A). Low side to chassis.	4.5MC (7.5KC Swp)	4.5MC	Any unused channel	Vert. Amp. across volume control	A12	Set generator to give minimum useful indication on scope. Adjust for maximum response at 4.5MC.
8.	"	"	"	"	"	"	A13	Set generator to give a strong signal and adjust A13 for maximum response at 4.5MC.
9.	"	"	"	4.5MC (400∿ Mod)	"	"	R5	Starting with a very low signal input, gradually increase the level at the same time as rotating the quieting control (R5) back and forth until the signal level reaches the point where the AM output on scope dips to zero with a rise on each side as R5 is rotated. Set R5 for zero output at this signal level.

SOUND IF ALIGNMENT USING A TV SIGNAL

Tune the receiver to a TV station and connect an attenuator between receiver and antenna so that the signal input to receiver may be varied from weak to strong.
Set the quieting control (R5) to its mid-range position.
Apply a strong signal and adjust A13 for maximum program sound. If two widely separated peaks appear, use the one with A13 furthest counter clockwise.
If two peaks occur within a narrow range of adjustment, the signal strength being applied is too low or quieting control is improperly adjusted.
Reduce the signal to its lowest level and adjust A12 for maximum program sound.
Readjust signal input to its lowest audible level and recheck setting of A12 and A13.
Apply a very weak signal and adjust R5 for minimum noise. Do not leave R5 at maximum counter clockwise position.

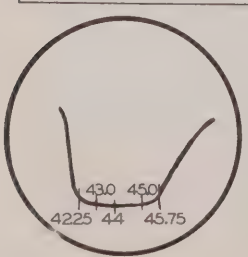


FIG. 1

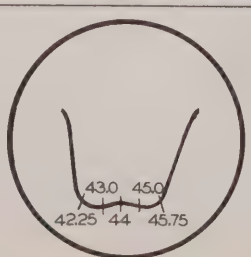


FIG. 2

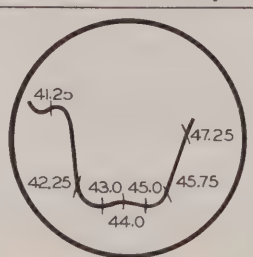


FIG. 3

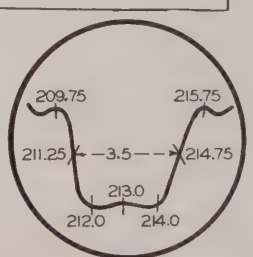


FIG. 4

ALIGNMENT INSTRUCTIONS (cont)

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RF AND MIXER ALIGNMENT

Disconnect the white (AGC buss) wire from tuner terminal "D". Connect the negative side of a 1.5 volt battery to terminal "D". Connect positive lead to chassis.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
10.	Fig. 5	Thru matching network (Fig. 5) across antenna terminals.	207MC (12MC Swp)	205.25MC 209.75MC	12	Vert. Amp. thru 10KΩ to point B . Low side to tuner chassis.	A14, A15, A16	Adjust for response curve similar to Fig. 7 with markers above 90%.
11.	"	"	213MC (12MC Swp)	211.25MC 215.75MC	13	"		If markers fall below 70% on any channel make compromise adjustment of A14, A15 and A16 with channel switch set to that channel, then check all other channels to see that they have not been seriously affected.
			201MC (12 MC Swp)	199.25MC 203.75MC	11			
			195MC (12MC Swp)	193.25MC 197.75MC	10			
			189MC (12MC Swp)	187.25MC 191.75MC	9			
			183MC (12MC Swp)	181.25MC 185.75MC	8			
			177MC (12MC Swp)	175.25MC 179.75MC	7			
			85MC (12MC Swp)	83.25MC 87.75MC	6			
			79MC (12MC Swp)	77.25MC 81.75MC	5			
			69MC (12MC Swp)	67.25MC 71.75MC	4			
			63MC (12MC Swp)	61.25MC 65.75MC	3			
			57MC (12MC Swp)	55.25MC 59.75MC	2			

OSCILLATOR ALIGNMENT

Complete oscillator alignment may not be necessary.
If the oscillator seems to be off frequency approximately the same amount for a majority of the channels it may be possible to correct them in one step using A17. It should be noted that this is an all channel oscillator circuit adjustment and should not be used to correct any individual channel.
If adjustment of A17 will not bring all channels well within the range of the fine tuning control it will be necessary to adjust the channel strip adjustment for each channel that is off frequency. The channel oscillator adjustment screws are reached thru a hole just above the channel switch shaft.
The correct adjustment screw is accessible thru this hole as the channel switch is turned to each channel.
Leave the bias connected as under "RF and Mixer Alignment".
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Set the fine tuning control to the mid-position of its range.

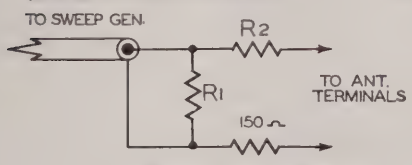
	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
12.	Fig. 5	Thru matching network (Fig. 5) across antenna terminals.	213MC (10MC Swp)	211.25MC 215.75MC	13	Vert. Amp. thru 47KΩ to point A . Low side to chassis.	A18	Adjust to place sound marker in trap notch as in Fig. 8. Video marker should be at 50%. Restore tuner AGC lead to its original connection at tuner terminal "D".
			207MC (10MC Swp)	205.25MC 209.75MC	12		A19	
			201MC (10MC Swp)	199.25MC 203.75MC	11		A20	
			195MC (10MC Swp)	193.25MC 197.75MC	10		A21	
			189MC (10MC Swp)	187.25MC 191.75MC	9		A22	
			183MC (10MC Swp)	181.25MC 185.75MC	8		A23	
			177MC (10MC Swp)	175.25MC 179.75MC	7		A24	
			85MC (10MC Swp)	83.25MC 87.75MC	6		A25	
			79MC (10MC Swp)	77.25MC 81.75MC	5		A26	
			69MC (10MC Swp)	67.25MC 71.75MC	4		A27	
			63MC (10MC Swp)	61.25MC 65.75MC	3		A28	
			57MC (10MC Swp)	55.25MC 59.75MC	2		A29	

SERIES RESONANT TRAP ADJUSTMENT

The series resonant trap should be adjusted in the field whenever local interference on channel 2 is encountered. When interference is noticed adjust A30 for minimum interference in the picture.

UHF TUNER ALIGNMENT

The UHF tuner portion used in sets with combination VHF-UHF has been properly aligned at the factory. If has been recommended that only minor adjustments be made such as soiled contacts and replacement of crystal and tube. Due to the slight differences in the characteristics of tubes of the same type, it may be necessary to try several tubes when a replacement is needed in the UHF portion of the tuner. Alignment is not recommended in the field.



Z_0 = SWEEP CABLE IMPEDANCE

FIG. 5

Z_0	R1	R2
50Ω	56Ω	120Ω
72Ω	82Ω	110Ω

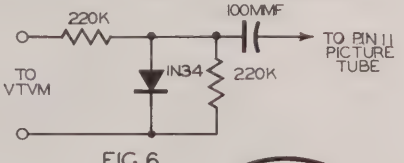


FIG. 6

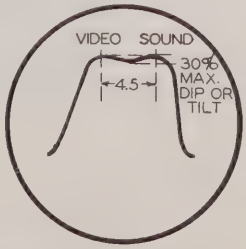


FIG. 7

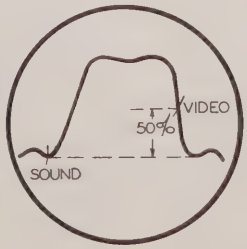
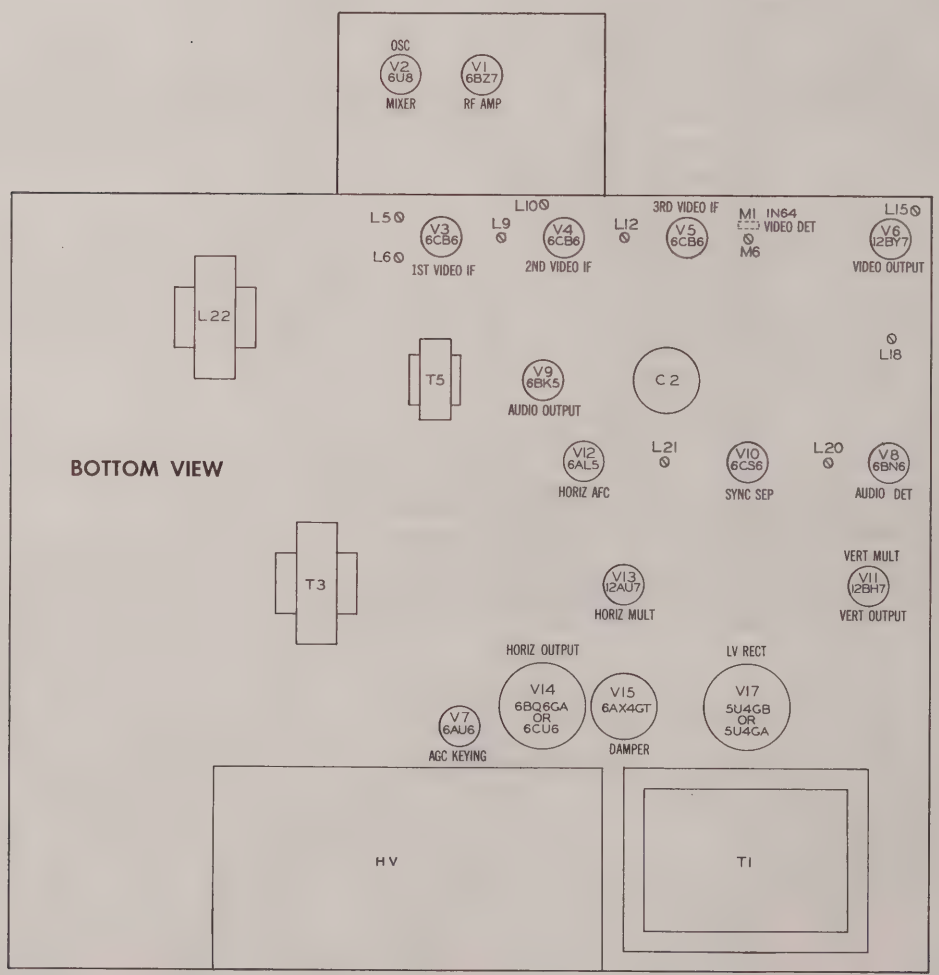


FIG. 8

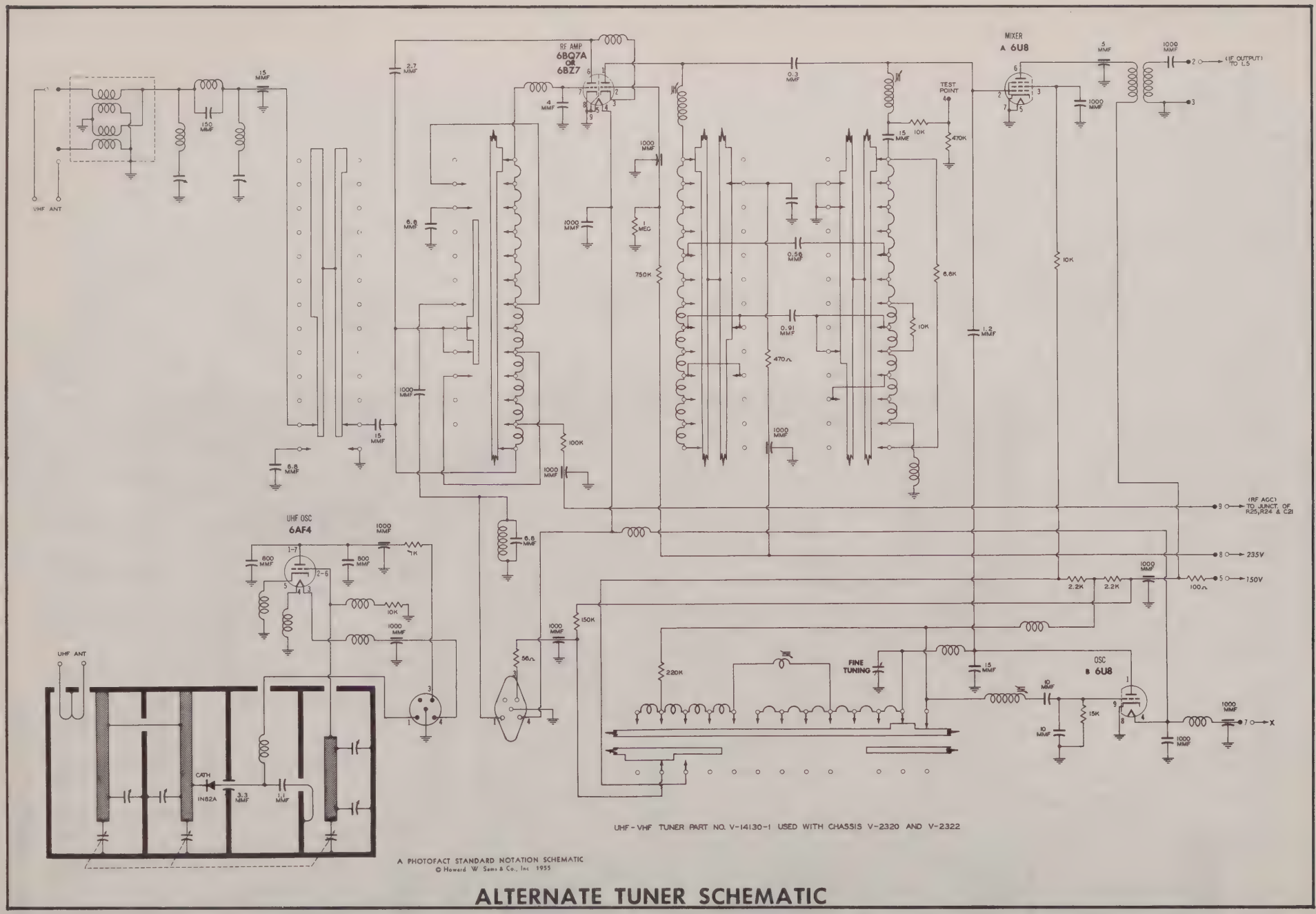
RESISTANCE MEASUREMENTS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6BZ7	†1. 5KΩ	†300KΩ	INF	0Ω	. 1Ω	INF	1. 7Meg	0Ω	†1. 5KΩ
V 2	6U8	†5KΩ	200KΩ	†18KΩ	. 1Ω	0Ω	†3KΩ	0Ω	0Ω	10KΩ
V 3	6CB6	110KΩ	68Ω	. 1Ω	0Ω	†2. 3KΩ	†2. 3KΩ	0Ω		
V 4	6CB6	110KΩ	68Ω	. 1Ω	0Ω	†2. 3KΩ	†2. 3KΩ	0Ω		
V 5	6CB6	. 4Ω	150Ω	. 1Ω	0Ω	†2. 8KΩ	†2. 8KΩ	0Ω		
V 6	12BY7	10Ω	2. 7KΩ	0Ω	. 1Ω	. 1Ω	0Ω	†3. 3KΩ	†1. 8KΩ	0Ω
V 7	6AU6	†25KΩ	†16KΩ	. 1Ω	0Ω	500KΩ	†45Ω	†16KΩ		
V 8	6BN6	400Ω	. 3Ω	. 1Ω	0Ω	†22KΩ	7Ω	†330KΩ		
V 9	6BK5	†1KΩ	TP	300KΩ	. 1Ω	0Ω	180Ω	300KΩ	†550Ω	TP
V 10	6CS6	50KΩ	0Ω	0Ω	. 1Ω	†16KΩ	†12KΩ	2. 2Meg		
V 11	12BH7	▲5. 8KΩ	1. 5Meg	2KΩ	0Ω	0Ω	▲4. 5Meg	500KΩ	1. 6KΩ	. 1Ω
V 12	6AL5	1Meg	0Ω	0Ω	. 1Ω	1Meg	0Ω	2Meg		
V 13	12AU7	†56KΩ	2. 7Meg	820Ω	. 1Ω	. 1Ω	†56KΩ	350KΩ	820Ω	0Ω
V 14	6BQ6GA	NC	0Ω	NC	†14KΩ	470KΩ	TP	. 1Ω	0Ω	Top Cap ▲21Ω
V 15	6AX4GT	TP	NC	1Meg	NC	†45Ω	NC	. 1Ω	0Ω	
V 16	1B3GT		PINS	1 - 8	HAVE	INFINITE	RESISTANCE			Top Cap ▲600Ω
V 17	5U4GB	NC	20KΩ	NC	22Ω	NC	23Ω	NC	20KΩ	
V 18	21YP4	. 1Ω	†180KΩ	Pin 6 ▲33KΩ	Pin 10 ▲33KΩ	Pin 11 †100KΩ	Pin 12 0Ω			

† MEASURED FROM PIN 8 OF V17.
▲ MEASURED FROM PIN 3 OF V15.
TP - TIE POINT
NC - NO CONNECTION



TUBE PLACEMENT CHART



UHF - VHF TUNER PART NO. V-14130-1 USED WITH CHASSIS V-2320 AND V-2322

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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ALTERNATE TUNER SCHEMATIC

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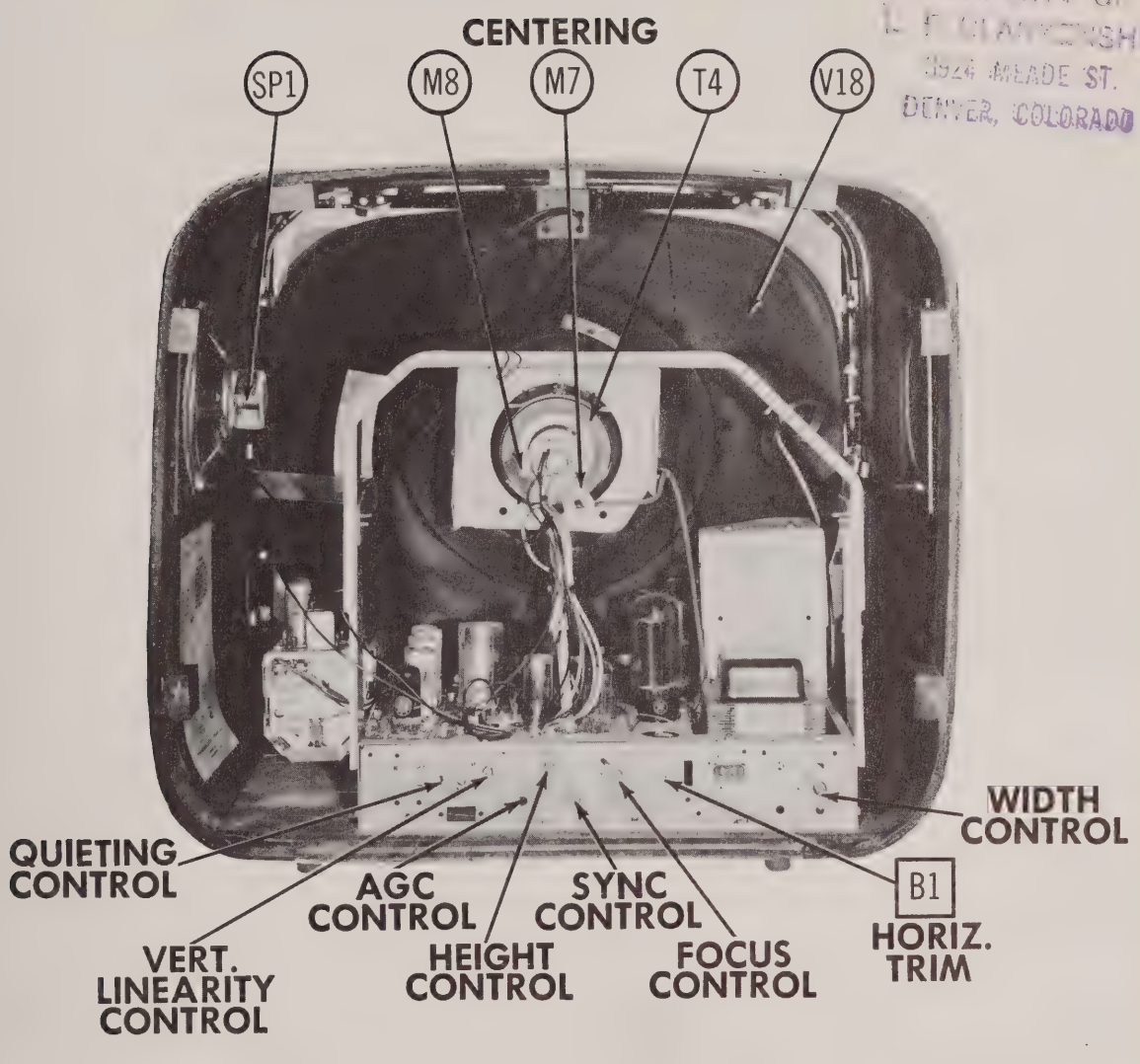

CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station, preferably a test pattern.

1. Set the horizontal hold control to its mid-range position.
2. Connect a short jumper across the horizontal oscillator coil (L21).
3. Connect the DC probe of VTVM to pin 2 (grid) of 12AU7 (V13). Connect positive lead to chassis. Adjust the horizontal range trimmer (B1) for zero volts on VTVM. If necessary, readjust horizontal hold control slightly to obtain zero reading on VTVM.
4. Remove jumper across L21 and adjust horizontal oscillator slug (B2) for zero reading on VTVM. Switch off channel and back again. Picture should pull into sync.

Adjust the horizontal width control (R11) for a picture that is slightly wider than necessary to fill the picture mask horizontally.

TROUBLE SHOOTING AIDS

SWEEP

HORIZONTAL

LOSS OF SWEEP

Follow procedure outlined under "Loss of High Voltage".

INSUFFICIENT SWEEP

Check by substitution V14, V15 and V17. Check T2, T4A, C76, C77, R100, R11, R95 and other associated components.

DRIVE LINES

Check by substitution V14 and V15. Check R95, R100, C77, T2, T4A and other associated components.

COMPRESSED LEFT SIDE

Check by substitution V14 and V15. Check horizontal output and damper stages for component failure or change of value.

FOLDS

Follow procedure outlined under "Drive Lines".

PIE CRUST EFFECT

Check by substitution V13, V14 and V15. Check C72 for open. Check L21, C74, C70, C73, C69, R93 and other associated components.

XMAS TREE EFFECT

Check by substitution V13, V14, and V15. Check T2 and T4 for internal arcing. Check L21, C74, C75, C77, C68, C67, R95, R96, R92 and other associated components.

VERTICAL

LOSS OF SWEEP

Substitute V11. Check waveform W9.

If Satisfactory	If Unsatisfactory
Check T3, T4B, R82, R81, C2B, C64 and other associated components.	Check C57, C58, C59, R74, R75, R8 and other associated components.

INSUFFICIENT SWEEP

Substitute V11. Check height and vertical linearity controls for proper operation. Check R75, T3 and other associated components.

COMPRESSED AT BOTTOM

Substitute V11. Check R75, R8, R82, R81, C58, C57 and other associated components.

COMPRESSED AT TOP

Substitute V11. Check C58, C59, C2C, R6, R81, T3 and other associated components.

FOLDS

Substitute V11. Check C60, C61, R81, T3, T4B and other associated components.

SYNC

LOSS OF VERTICAL AND HORIZONTAL SYNC

Substitute V10. Check C53, C54, C55, R66, R65 and other associated components.

LOSS OF VERTICAL SYNC-HORIZONTAL SYNC SATISFACTORY

Substitute V11. Check vertical integrator network. Check R71, R3, C57 and other associated components.

LOSS OF HORIZONTAL SYNC-VERTICAL SYNC SATISFACTORY

Check by substitution V12 and V13. Check C66, C69, C71, R94, R2, L21 and other associated components.

HORIZONTAL BENDING

Check by substitution V10, V12 and V13. Check horizontal AFC network.

VIDEO

LOSS OF VIDEO

Substitute V6. Check L14, L17, R43, R44, R41, C38, C40, C41 and other associated components.

SOUND BARS (4.5MC BEAT)

Adjust tuner fine tuning for best sound and picture. Check adjustment A11. Check video IF Alignment.

POOR CONTRAST

Substitute V6. Check C41, C40, C38, L16, R46, R42 and other associated components.

NEGATIVE PICTURE

Substitute V6. Check picture tube. Check C40, C41, L13, L16, R42 and other associated components.

SMEAR

Substitute V6. Check L13, L14, L16, C39, C40, C41 and other associated components.

WIDE BLACK BAR ACROSS PICTURE

Check by substitution V1, V3, V4, V5, V6 and V7 for heater to cathode leadage.

AUDIO

WEAK OR NO SOUND

Check by substitution V8 and V9. Check stage V9 using audio signal generator. Apply audio signal across R1B.

If Satisfactory	If Unsatisfactory
Check components associated with V8.	Check C51, C2A, C50, C52, C1C, R60, R59, R56, R54, T5 speaker and other associated components.

BUZZ

Adjust tuner fine tuning for best sound and picture. Check adjustments A13 and R5 for minimum buzz. If still unsatisfactory, check audio alignment.

DISTORTED

Follow procedure outlined under "Weak Or No Sound".

POWER

DEAD SET

If filaments fail to light, check AC interlock assembly. Check switch on volume control and T1. If filaments light, substitute V17. Check B+ filter and decoupling network.

SMALL AND/OR DIM PICTURE

Substitute V17. Check B+ filter and decoupling network.

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		Westinghouse PART No.	STANDARD REPLACEMENT		
V1	RF Amplifier	6BZ7	6BZ7	9AJ	
V2	Mixer - Osc.	6U8	6U8	9AE	
V3	1st. Video IF Amp.	6CB6	6CB6	7CM	
V4	2nd. Video IF Amp.	6CB6	6CB6	7CM	
V5	3rd. Video IF Amp.	6CB6	6CB6	7CM	
V6	Video Output-	12BY7	12BY7	9BF	
V7	AGC Keying	6AU6	6AU6	7BK	
V8	Audio Detector	6BN6	6BN6	7DF	
V9	Audio Output	6BK5	6BK5	9BQ	
V10	Sync Separator	6CS6	6CS6	7CH	
V11	Vert. Mult.- Vert. Output	12BH7	12BH7	9A	
V12	Horiz. AFC	6AL5	6AL5	6BT	
V13	Horiz. Mult.	12AU7	12AU7	9A	
V14	Horiz. Output	6BQ6GA	6BQ6GA	6AM	6CU6 used as an alternate
V15	Damper	6AX4GT	6AX4GT	4CG	
V16	HV Rectifier	1B3GT	1B3GT	3C	
V17	LV Rectifier	5U4GB	5U4GB	5T	5U4GA used as an alternate

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CATHODE-RAY TUBE

ITEM No.	REPLACEMENT DATA					RETMA BASE TYPE	NOTES
	Westinghouse PART No.	CBS-HYTRON PART No.	GENERAL ELECTRIC PART No.	SYLVANIA PART No.	WESTINGHOUSE PART No.		
V18	21YP4	21YP4	21YP4	21YP4	21YP4	12L	① Aluminized
		21YP4A ①	21YP4A ①	21YP4A ①	21YP4A ①	12L	
	17VP4 / 17LP4	17VP4 / 17LP4	17VP4 / 17LP4	17VP4 / 17LP4		12L	
	17LP4A ①	17LP4A ①				12L	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT	Westinghouse PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1A	▲40	450	V-9891			FP428.4	TM-4030	Q-325	
B	■40	450							
C	30	350							
D	▲30	350							
C2A	30	50	V-11535-1			FP366.5	TM-4115	T-815	
B	▲30	500				TC84		S-055	
C	▲150	50							
D	■10	450							
C3	3-9			829-10					
C4	1000		V-8662	DD-102	801-001	DC-521			
C5	3		V-8659	TCZ-3	NP0A-030	ZT-5533			
C6	800								
C7	.5-3			829-3	3115-01-0R5	CT565A			
C8	1.5		V-8749	TCZ-1.5	NP0A-1R5	ZT-5515			
C9	47		V-8661	D6-470	831-470	UC-5447			
C10	800								
C11	47		V-8755						
C12	.5-3			829-3	3115-01-0R5	CT565A			
C13	5		V-8756						
C14	10		V-8746						
C15	.5-3			829-3	3115-01-0R5	CT565A			
C16	220		V-8748	D6-221	811-221	UC-5322			
C17	75		V-8747						
C18	1000		V-8662	DD-102	801-001	DC-521			
C19	800								
C20	800								
C21	.05	400	RCP10W4503M	DF-503		PT415	IMP4-S5	330415	
C22	.02	600	RCP10M8203M	DF-203	817-02	PT612	IMP6-S2	330612	
C23	.1	400	RCP10M4104M	DF-104		PT401	IMP4-P1	330401	
C24	2.2		V-8963-2296	TCZ-2.2	NP0A-2R2				
C25	68		R1CC20S2L680K	TCZ-68	NP0L-680	ZT-5468		KR-1468	
C26	800		R2CC61Z5Z801P	DD-801	801-001	DC-521		K-1380	
C27	800		R2CC61Z5Z801P	DD-801	801-001	DC-521		K-1380	
C28	800		R2CC61Z5Z801P	DD-801	801-001	DC-521		K-1380	
C29	2.2		V-8963-2296	TCZ-2.2	NP0A-2R2				
C30	47		R1CC20S2L470K	D6-470	GP1K-470	UC-5447		K-1447	
C31	800		R2CC61Z5Z801P	DD-801	801-001	DC-521		K-1380	
C32	800		R2CC61Z5Z801P	DD-801	801-001	DC-521		K-1380	
C33	5000		R2CC62Z5Z502P	DD-502	811-005	DC-525		C-1250	
C34	.47		V-8963-4788						Note 1
C35	800		R2CC61Z5Z801P	DD-801	801-001	DC-521		K-1380	
C36	800		R2CC61Z5Z801P	DD-801	801-001	DC-521		K-1380	
C37	800		R2CC61Z5Z801P	DD-801	801-001	DC-521		K-1380	
C38	1000		R2CC62Y5Y102M	DD-102	801-001	DC-521		K-1210	
C39	56	500	RCM20B560K	TCZ-56	NP0K-560	ZT-5456		KR-1456	
C40	33		V-9863-3300	D6-330	GP1K-330	UC-5433		K-1433	
C41	.1	400	RCP10W4104M	DF-104		PT401	IMP4-P1	330401	
C42	.25	400	RCP10W4254M			PT4025	IMP4-P25	3304025	
C43	.1	400	RCP10W4104M	DF-104		PT401	IMP4-P1	330401	
C44	.25	400	RCP10W4254M			PT4025	IMP4-P25	3304025	
C45	.1	400	RCP10W4104M	DF-104		PT401	IMP4-P1	330401	
C46	1.5			TCZ-1.5	NP0A-1R5	ZT-5515			Note 2
C47	1.5			TCZ-1.5	NP0A-1R5	ZT-5515			Note 2
C48	150	500	RCM20B151K	TCZ-150	NP0-334-151	MCB236		KR-1315	
C49A	5000		V-9044-1	DD2-502	811-005	DC-525		C-1250	
B	5000				811-005	DC-525		C-1250	
C50	2000		R2CC63Y5Y202M	DD-202	801-002	DC-522		C-1220	
C51	.02	600	RCP10M6203M	DF-203	817-02	PT612	IMP6-S2	330612	
C52	5000		R2CC63Y502M	DD-502	811-005	DC-525	IMP6-D5	C-1250	
C53	.01	600	RCP10M6103M	D6-103	GP2-333-103	PT611	IMP6-S1	330611	
C54	270	500		D6-271	GP2K-271	UC-5327		K-1327	Note 3
C55	.5	400	RCP10W4504M			PT405	IMP4-P5	330405	
C56A	5000		V-9044-1	DD2-502	811-005	DC-525	IMP6-D5	C-1250	
B	5000				811-005	DC-525	IMP6-D5	C-1250	
C57	.005	600	RCP10M6502M	D6-502	GP2-333-502	PT625	IMP6-D5	330625	
C58	.1	600	RCP10M6104M	DF-104		PT601	IMP6-P1	330601	
C59	.001	1000	RCP10M10102M	DD16-102	1R5KV-102	PT1621	CT10-D1	2116-001	

CAPACITORS (cont)

ITEM No.	RATING CAP	RATING VOLT	Westinghouse PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	NOTES
			REPLACEMENT DATA						
C60	001	600	RCP10M6102M	DS-102	GP21-102	PT621	IMPS-D1	330611	
C61	002	400	RCP10M6302M	DS-202	GP21-202	PT623	IMPS-D3	330622	
C62	02	600	RCP10M6302M	DF-203	617-D3	PT623	IMPS-G3	330612	
C63	02	600	RCP10M6302M	DF-203	617-G3	PT623	IMPS-G3	330612	
C64	25	400	RCP10W4254M			PT4025	IMPS-P25	3304025	
C65	.01	600	RCP10M6103M	DS-103	GP2-333-103	PT611	IMPS-S1	330611	
C66	150	500	RCM30B151K	TCZ-150	NPO-334-151	MCB233		KR-1315	
C67	100	500	RCM20B101K	TCZ-100	NPO-337-101	MCB325		KR-1310	
C68	100	500	RCM20B391K			MCB345		KR-1339	
C69	680	500	RCM20B681K					KR-1358	
C70	01	600	RCP10M6103M	DS-103	GP2-333-103	PT611	IMPS-S1	330611	
C71	005	600	RCP10M6503M	DS-503	GP2-333-503	PT615	IMPS-D5	330625	
C72	01	600	RCP10M6103M	DS-103	GP2-333-103	PT611	IMPS-S1	330611	
C73	1	400	RCP10W4104M	DF-104		PT601	IMPS-P1	330401	
C74	3900	500	RCM30C392K			MCB463		CR-1339	
C75	82	500	RCM20B820K	TCZ-82	NPOL-820				
C76	390	500	RCM20B391K			MCB343		KR-1339	
C77	.01	600	RCP10M6103M	DS-103	GP2-333-103	PT611	IMPS-S1	330611	
C78	1000		RCC26G75Y103M	DD-102	801-001	DC-531	IMPS-D1	K-1310	
C79	.1	600	RCP10M6104M	DF-104		PT601	IMPS-P1	330601	
C80	.1	400	RCP10M4104M	DF-104		PT601	IMPS-P1	330401	
C81	.15	400	RCP10M4154M			PT615	IMPS-P15	3306015	
C82	47		V-9782-1047U	DD30-470	5KV-470	DC30447			Note 4
C83	01	600	V-5040-15	DS-103	GP2-333-103	PT611	IMPS-S1	PC-0611	

Note 1. Used only with 3rd. Video IF transformer part #V-9979-1.
Note 2. When C45 is 3 3MMF (part #V-9926-2), C47 is not used.
Note 3. Not used in some versions.
Note 4. 51MMF capacitor (part #V-9782-1051U) used with deflection yoke part #V-14658-1.

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	Westinghouse PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
			REPLACEMENT DATA					
R1A	1MΩ	1	V-1439E-3	*QJ-639	RTV-511	FI-35	UET948	Picture - Panel
B	500KΩ	1				R2-41		Volume - Rear
C	Switch					KB-1		Attach to R1B
R2A	60KΩ	1	V-1153E-3	QJ-125	A47-76K-S	AB-35	U-61	Horiz. Hold
B	Shaft		Not Req.	Not Req.	KS8-3	AK-4	Not Req.	Attach to R2A
R3A	500KΩ	1	V-1153D-2	QJ-114	A47-500K-S	AB-10	U-34	Vert. Hold
B	Shaft		Not Req.	Not Req.	KS8-3	AK-4	Not Req.	Attach to R3A
R4A	100KΩ	1	V-1153F-2	QJ-118	A47-100K-S	AB-40	U-41	Brightness
B	Shaft		Not Req.	Not Req.	KS8-3	AK-4	Not Req.	Attach to R4A
R5	50KΩ	1	V-1154-2		39-500			Quieting -(Wire wound)
R6A	5000Ω	1	V-1170-1	QJ-114	A47-5000-S	AB-10	U-34	Vert. Linearity
B	Shaft		Not Req.	Not Req.	FK2-1/4	AK-1	Not Req.	Attach to R6A
R7A	750KΩ	1	V-1227J-1	QJ-130	A47-750K-S	BK-89	SU-54	AGC
B	Shaft		Not Req.	Not Req.	FK2-1/4	AK-1	Not Req.	Attach to R7A
R8A	5 Meg	1	V-1270F-4	QJ-141	A47-5Meg-S	AB-87	U-67	Height
B	Shaft		Not Req.	Not Req.	FK2-1/4	AK-1	Not Req.	Attach to R8A
R9A	5 Meg	1	V-1270J-4	QJ-141	A47-5Meg-S	AB-87	U-67	Sync
B	Shaft		Not Req.	Not Req.	FK2-1/4	AK-1	Not Req.	Attach to R9A
R10A	2Meg	1	V-1270F-3	QJ-139	A47-2Meg-S	BK-75	U-66	Focus
B	Shaft		Not Req.	Not Req.	FK2-1/4	Not Req.	Not Req.	Attach to R10A
R11A	7500Ω	2	V-1271G-2	WK-7500	A43-7500	V-135	R7500L	Width -(Wire wound)
B	Shaft		Not Req.	Not Req.	Not Req.	Not Req.	Not Req.	Attach to R11A

* CONCENTRIKIT EQUIVALENT: KIT K-2, BASE ELEMENTS & SHAFTS: B11-118 & P1-123 (PANEL)
B11-133 & R14-314 (REAR)
76-1 SWITCH

RESISTORS

ITEM No.	RATING OHMS	RATING WATT	Westinghouse PART No.	IRC PART No.	NOTES
			REPLACEMENT DATA		
R13	22KΩ	1	RC30AE223K	BTS-22K	
R14	47KΩ		RC30AE473K	BTS-47K	
R15	820KΩ			BTS-820K	
R16	470KΩ			BTS-470K	
R17	1500Ω			BTA-1500	
R18	6800Ω			BTS-6800	
R19	100KΩ		RC30AE104K	BTS-100K	
R20	100KΩ		RC30A104K	BTS-100K	
R21	150KΩ		RC30AE153K	BTS-150K	
R22	1000Ω		RC30AE102K	BTS-1000	
R23	10KΩ		RC30AE103K	BTS-10K	
R24	3300Ω		RC30AE332K	BTS-3300	
R25	15 Meg 5%		RC30AE156M	BTS-15Meg 5%	
R26	1.5Meg 5%		RC30AE155J	BTS-1.5Meg 5%	
R26	10Ω	1	RC30AE100K	BTS-10	
R27	10KΩ		V-9927-10	BTS-10K	
R28	390KΩ		RC30AE394K	BTS-390K	
R29	68Ω		RC30AE680K	BTS-68	
R30	470Ω		RC30AE471M	BTS-470	
R31	4700Ω 5%		V-9927-3	BTS-4700 5%	
R32	100KΩ		RC30AE103M	BTS-10K	
R33	100KΩ 5%		RC30AE104J	BTS-100K 5%	
R34	68Ω		RC30AE680K	BTS-68	
R35	470Ω		RC30AE471M	BTS-470	
R36	4700Ω 5%		V-9927-3	BTS-4700 5%	
R37	150Ω		RC30AE151K	BTS-150	
R38	470Ω		RC30AE471M	BTS-470	
R39	470Ω		RC30AE471K	BTS-470	
R40	560Ω		RC30AE561K	BTS-560	
R41	2700Ω		RC30AE272K	BTS-2700	
R42	12KΩ		RC30AE123K	BTS-12K	
R43	3300Ω	2	RC40AE332K	BTB-3300	
R44	3300Ω	2	RC40AE332K	BTB-3300	
R45	16KΩ	2	RC40AE153K	BTB-16K	
R46	150KΩ		RC30AE154K	BTS-150K	
R47	330KΩ		RC30AE334K	BTS-330K	
R48	100KΩ		RC30AE104K	BTS-100K	
R49	150KΩ		RC30AE154K	BTS-150K	

ITEM No.	RATING OHMS	RATING WATT	Westinghouse PART No.	IRC PART No.	NOTES
			REPLACEMENT DATA		
R50	22KΩ	1	RC30AE223K	BTS-22K	
R51	56KΩ		RC30AE563K	BTA-56K	
R53	22KΩ 5%		RC30AE223K	BTS-22K 5%	
R54	1000Ω		RC20AE102K	BTS-1000	
R55	22KΩ	2	RC40AE223K	BTB-22K	
R56	330KΩ		RC30AE334K	BTS-330K	
R57	12KΩ		RC30A123K	BTS-12K	
R58	150Ω		RC30AE151M	BTS-150	
R59	180Ω		RC30AE181M	BTS-180	
R60	470Ω	3	RC40A471K	BTB-470	
R61	6800Ω		RC30AE682K	BTS-6800	
R63	470KΩ			BTS-470K	Note 1
R63	2.2Meg			BTS-2.2Meg	Note 2
R64	270KΩ	3	RC20A274K	BTS-270K	
R65	100KΩ			BTS-100K	Note 3
R66	22KΩ		RC20AE223K	BTS-22K	
R67	5600Ω		RC20AE562K	BTS-5600	Note 4
R68	12KΩ		RC20AE123K	BTS-12K	Note 5
R69	8200Ω		RC20AE822K	BTS-8200	
R70	8200Ω		RC30AE822K	BTB-8200	
R71	82KΩ		RC30AE823K	BTA-82K	
R72	470KΩ		RC30AE474K	BTS-470K	
R73	47KΩ		RC30AE473K	BTS-47K	
R74	10Meg		RC30AE106K	BTS-10Meg	
R75	3.3Meg		RC30AE335K	BTS-3.3Meg	
R76	2.2Meg		RC20AE225K	BTS-2.2Meg	
R77	100KΩ		RC30AE104K	BTS-100K	
R78	22KΩ 5%		RC30AE223K	BTS-22K 5%	
R79	1.5Meg		RC20AE155K	BTS-1.5Meg	
R80	100Ω		RC30AE101K	BTS-100	
R81	68Ω		RC20AE681K	BTS-680	
R82	3900Ω	2	RC40AE392K	BTB-3900	
R83	33KΩ		RC30AE333K	BTS-33K	
R84	56Ω		RC30AE561K	BTS-560	
R85	56Ω		RC30AE561K	BTS-560	
R86	1Meg		RC30AE105K	BTS-1Meg	
R87	1Meg		RC30AE105K	BTS-1Meg	
R88	330KΩ		RC30AE334K	BTS-330K	

PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS (cont)

ITEM No.	RATING OHMS	RATING WATT	Westinghouse PART No.	IRC PART No.	NOTES
			REPLACEMENT DATA		
R89	470KΩ		RC20AE474K	BTS-470K	
R90	47KΩ		RC20AE473K	BTS-47K	
R91	33KΩ		RC20AE333K	BTS-33K	
R92	820Ω		RC20AE821K	BTS-820	
R93	56KΩ		RC30AE563K	BTA-56K	
R94	270KΩ 5%		RC20AE274J	BTS-270K 5%	
R95	56KΩ		RC20A563K	BTS-56K	
R96	100Ω		RC20A101K	BTS-100	
R97	560Ω		RC20AE562K	BTS-5600	
R98	470KΩ		RC20AE474K	BTS-470K	

ITEM No.	RATING OHMS	RATING WATT	Westinghouse PART No.	IRC PART No.	NOTES
			REPLACEMENT DATA		
R99	150Ω	1	RC20AE151M	BTS-150	
R100	6800Ω		V-1211-2	BTS-3W	
R101	330Ω		RC20AE331K	BTS-330	
R102	2.2Ω		RR1328R2R		
R103	100KΩ	1	V-9987-18	BTA-100K	
R104A	1200Ω	8	V-10056-5		
B	600Ω	3			
R105	100KΩ	1	V-12805-5	BTA-100K	
R106	10Ω			BTS-10	Note 1

Note 1: Not used in some versions.
Note 2: Some versions use a 1Meg resistor in this application.
Note 3: Some versions use a 680KΩ 2 watt resistor in this application.
Note 4: Some versions use a 12KΩ resistor in this application.
Note 5: Some versions use a 5800Ω resistor in this application.

TRANSFORMER (POWER)

ITEM No.	RATING			Westinghouse PART No.	Halldorson PART No.	Merit PART No.	RCA TYPE No	Stancor PART No.	Thordarson PART No.	Triad PART No.
	#2.	SEC 1	SEC 2	REPLACEMENT DATA						
T1	117VAC @ 1.46A	506VCT .250ADC	5VAC @ 3A	V-12805D-2		P-3076 ①			26N33①	
	SEC 3	SEC 4	SEC 5							
	12.6VCT @ 4.2A									

① Parallel and phase 6.3V windings for Sec. #3.
② Tape extra 5V winding.
③ Use high voltage secondary taps. Tape other leads.
④ Series 6.3V windings for 12.6VCT Sec. #3.

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No.	USE	Westinghouse PART No.	Halldorson PART No.	Merit PART No.	RCA PART No.	Rem PART No.	Stancor TYPE No.	Thordarson PART No.	Triad PART No.
		REPLACEMENT DATA							
T2	Horiz. Output Trans.	V-14346-1	FB41① & RF800①②	HVO-9 & MWC-1④①	2327①④	X098P①	A-8236*	FLY-72*	D-38*①
T3	Vert. Output Trans.	V-9981-8	21806②	A-3039②	2287①②	V312①	A-8141①	26B54③	A-104X①
T4A	Yoke-Horiz. (59.5MH)	V-12218-4 ⑤	DF605⑤⑥	MDF-73⑤	2322①③⑦	V70F30/43 ⑤⑦	DY-11A④	Y-10④⑤	Y-22-1④
B	Vert. (37MH)	V-12281-3 ③				⑤⑦	⑤		⑤

① Drill new mounting hole(s).
② Connect blue lead to plate; connect red lead of trans. to junction of C64, C64 and orange lead of yoke; remove green lead of yoke and C64 from ground and connect to junction of C63, R62, R74 and R8A. (Point at which red lead of original trans. was connected.)
③ Alternate yoke part no.
④ Use original rear cover and centering device.
⑤ Connect horiz. damping network across terminals #3 and #1. Use original damping network, if necessary.
⑥ Remove damping capacitor from terminal #1 and #2. Use original damping network, if necessary.
⑦ Refer to instructions packed with unit pertaining to damping network.
⑧ Includes C82, R101, R64, R65 and part #V-14658-1.

*HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA

Use Original Width Coil Unless Replacement Type is Listed

ORIGINAL TERMINAL CONNECTIONS	Halldorson Replacement Connections	Merit Replacement Connections	RCA Replacement Connections	Rem Replacement Connections	Stancor Replacement Connections	Thordarson Replacement Connections	Triad Replacement Connections
4	9	9	10	1	3	3	10
7	7 or 5	7 or 5	8	3	4	4	8
6 (NC)	NC	NC	NC	NC	NC	NC	NC
3	1	1	3	4	7	7	3
5	Term #3 RF800	Orange Term MWC-1	1	7	5	5	1
1	Term #4 RF800	Black Term MWC-1	2	5	6	6	2
Connect Width Coil Across	Terms #1 & #2 RF800 across "7" & 1	Terms Red & Blue MWC-1 across "7" & 1					
Special Notes	①	①					②

① If AGC does not function properly, reverse width coil primary or secondary.
② Jumper terminals #9 & "7".

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI	IMPEDANCE SEC	Westinghouse PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
			REPLACEMENT DATA						
T5	7KΩ	3.3Ω	V-14080-2	21113 ①	A-2981 ①	A-3918 ①	26B48 ①	S-7X ①	① Drill one new mounting hole.

SPEAKER

ITEM No	RATINGS SIZE	FIELD	V. C. IMP	Westinghouse PART No	QUAM PART No.	NOTES
				REPLACEMENT DATA		
SP1	5 1.4"	9W	3.3Ω	V-10030-1	52A1	

COILS (RF, IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	Westinghouse PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
				REPLACEMENT DATA				
L1A	Ant. Coil	0Ω	0Ω	V-14176-3				Channel 3
B	Ant. Coil	0Ω	0Ω	V-14176-3				Channel 3
C	Ant. Coil	0Ω	0Ω	V-14176-4				Channel 4
D	Ant. Coil	0Ω	0Ω	V-14176-5				Channel 5
E	Ant. Coil	0Ω	0Ω	V-14176-6				Channel 6
F	Ant. Coil	0Ω	0Ω	V-14176-7				Channel 7
G	Ant. Coil	0Ω	0Ω	V-14176-8				Channel 8
H	Ant. Coil	0Ω	0Ω	V-14176-9				Channel 9
I	Ant. Coil	0Ω	0Ω	V-14176-10				Channel 10
J	Ant. Coil	0Ω	0Ω	V-14176-11				Channel 11
K	Ant. Coil	0Ω	0Ω	V-14176-12				Channel 12
L	Ant. Coil	0Ω	0Ω	V-14176-13				Channel 13
L2	Neut. Coil	0Ω						
L3A	RF, Mixer Grid & Osc. Coils	0Ω		V-14177-3				Channel 3
B	RF, Mixer Grid & Osc. Coils	0Ω		V-14177-3				Channel 3
C	RF, Mixer Grid & Osc. Coils	0Ω		V-14177-4				Channel 4
D	RF, Mixer Grid & Osc. Coils	0Ω		V-14177-5				Channel 5
E	RF, Mixer Grid & Osc. Coils	0Ω		V-14177-6				Channel 6
F	RF, Mixer Grid & Osc. Coils	0Ω		V-14177-7				Channel 7
G	RF, Mixer Grid & Osc. Coils	0Ω		V-14177-8				Channel 8
H	RF, Mixer Grid & Osc. Coils	0Ω		V-14177-9				Channel 9
I	RF, Mixer Grid & Osc. Coils	0Ω		V-14177-10				Channel 10
J	RF, Mixer Grid & Osc. Coils	0Ω		V-14177-11				Channel 11
K	RF, Mixer Grid & Osc. Coils	0Ω		V-14177-12				Channel 12
L	RF, Mixer Grid & Osc. Coils	0Ω		V-14177-13				Channel 13
L4	Conv. Plate	0Ω		V-9750				
L5	1st Video IF	0Ω		V-9982-9		17-4524*	TV-131	6219*
L6	4.5MC Trap	0Ω		V-9983-9			TV-131	
L7	Fil. Choke	0Ω		V-4886-3	19-1000		TV-189	4603
L8	Fil. Choke	0Ω		V-4886-3	19-1000		TV-189	4603
L9	2nd Video IF	.8Ω	.4Ω	V-9979-1	19-3135 ▲		TV-135	6231
L10	47.25MC Trap	0Ω		V-11973-1	20-1047			
L11	Fil. Choke	0Ω		V-4886-3	19-1000		TV-189	4603
L12	3rd Video IF	.8Ω	.4Ω	V-9979-1	17-4531▲		TV-135	6231
L13	Series Peaking Coil	4.4Ω		V-9903-3	19-3135			6153
L14	Shunt Peaking Coil	8.5Ω		V-9915-2	19-3300			4046
L15	4.5MC Trap	1.1Ω		V-9983-9	20-1004		TV-151	1680
L16	Series Peaking Coil	5.5Ω		V-9903-1	19-3125		TV-104	4044
L17	Shunt Peaking Coil	8.5Ω		V-9915-2	19-3300			4046
L18	Sound IF	.3Ω		V-9983-5	17-3400		TV-151	1680
L19	Fil. Choke	0Ω		V-4886-2	19-1000		TV-189	4603
L20	Quadrature Coil	7Ω		V-11396-1	17-1031▲			1470-A
L21	Horiz. Osc.	102Ω		V-9764	19-1576		TV-163	6220

* Use one winding only.
▲ Detune trap winding.
▲ Drill mounting holes.

FILTER CHOKE

ITEM No.	TOTAL DIRECT CURRENT	D. C. RESISTANCE	INDUCTANCE @ CURRENT 1000 (~)	Westinghouse PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No
	RATINGS			REPLACEMENT DATA					
L22	250ADC	43Ω	1 3 Hy.	V-9471J-3	C5037 ①	C-2996 ①	C-2336 ①	26C44	C-32X

① Drill one new mounting hole.

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	Westinghouse PART No.	SYLVANIA PART No.	NOTES
		REPLACEMENT DATA		
M1	1N54*	V-10916-1	1N60 or 1N132	Video Det.

* Some versions may use type CK706A crystal diode in this application.

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WESTINGHOUSE MODELS H-799TU17, B, H-799TU17, B, H-867TU21, H-867TU21, B, H-867TU21, H-867TU21, B, H-867TU21 (V), H-867TU21, H-867TU21, B, H-867TU21 (V), H-867TU21 (CH), V-2310, V-2312, V-2320, V-2322

PARTS LIST AND DESCRIPTIONS (Continued)

MISCELLANEOUS

ITEM No.	PART NAME	Westinghouse PART No.	NOTES
M2	Dial Light		#47; Not used in all versions.
M3A	Tuner	V-14170-2 (Code 305)	VHF - Used in some versions of chassis V-2310.
B	Tuner	V-14170-2 (Code 294)	VHF - Used in some versions of chassis V-2310.
C	Tuner	V-14170-2 (Code 294)	VHF - Chassis V-2312.
D	Tuner	V-14989-1*	VHF - Chassis V-2320 & V-2322.
M4	Tuner	V-14990-1*	UHF - Chassis V-2320 & V-2322.
M5A	Trap	V-8751	VHF Ant. Input Filter; Used with tuner part #V-1470-2 (Code 305)
B	Trap	V-8782	VHF Ant. Input Filter; Used with tuner part #V-1470-2 (Code 294)
M6	Video Det. Ass'y.	V-12128-1	Includes M1, Coils and capacitors.
M7	Centering Device		Part of deflection yoke cover (T4)
M8	Ion Trap	V-9784-4	
C1	Trimmer Cap.	V-11228-2	Horiz. Multivibrator Trimmer - (5-80MMF)
	Cabinet	V-1305-5	Models H-799T17B & H-799TU17B
	Cabinet	V-1408-1	Models H-879T21V, H-879T21S & H-879TU21
	Cabinet	V-1408-2	Models H-880T21V, H-880T21S & H-880TU21
	Cabinet	V-1308-5	Shell - Models H-867T21 & H-867TU21
	Cabinet	V-1308-10	Shell - Models H-868T21 & H-868TU21
	Cabinet	V-12047-3	Cabinet Front (Includes Lens) - Models H-867T21 & H-867TU21
	Cabinet	V-12047-2	Cabinet Front (Includes Lens) - Models H-868T21 & H-868TU21
	Knob	V-14426-3	Channel Sel. (VHF) - Models H-799T17B & H-867T21
	Knob	V-14426-1	Channel Sel. (VHF) - Model H-868T21
	Knob	V-12352-1	Channel Sel. (VHF) - Models H-879T21V, H-879T21S, H-880T21V & H-880T21S
	Knob	V-14520-5	Channel Sel. (VHF) - Models H-799TU17B, H-879TU21 & H-880TU21
	Knob	V-14422-1	Channel Sel. (VHF) - Models H-867TU21 & H-868TU21
	Knob	V-12930-3	VHF Fine Tuning - Models H-799T17B, H-867T21, H-868T21, H-879T21V, H-879T21S, H-880T21V, H-880T21S & UHF Tuning - Models H-799TU17B, H-867TU21, H-868TU21, H-879TU21 & H-880TU21.
	Knob	V-14423-1	VHF Fine Tuning - Models H-867TU21 & H-799TU17B.
	Knob	V-14423-2	VHF Fine Tuning - Models H-879TU21, H-880TU21 & H-868TU21,
	Knob	V-14425-1	UHF Dial - Models H-799TU17B, H-867TU21 & H-868TU21
	Knob	V-14219-1	UHF Dial - Models H-879TU21 & H-880TU21
	Knob	V-12913-3	On-Off-Volume - Models H-799T17B, H-799TU17B, H-867T21, H-867TU21, H-879T21V, H-879T21S, H-880T21V, H-880T21S, H-879TU21 & H-880TU21.
	Knob	V-12913-1	On-Off-Volume - Models H-868T21 & H-868TU21.
	Knob	V-12914-3	Picture - All Models
	Safety Glass	V-12036-1	Models H-799T17B & H-799TU17B.
	Safety Glass	V-1203601	Models H-867T21H-867TU21, H-868T21 & H-868TU21.
	Safety Glass	V-15446-1	Models H-879T21V, H-879T21S, H-880T21V, H-880T21S, H-879TU21 & H-880TU21.
	Mask	V-11909-1	Models H-867T21, H-867TU21, H-868T21 & H-868TU21.
	Mask	V-15305-1	Models H-879T21V, H-879T21S, H-880T21V, H-880T21S, H-879TU21 & H-880TU21.

* Tuner part no. V-14130-1 combines M3D & M4 into one complete unit as a replacement; M3D & M4 may also be replaced individually.

TROUBLE SHOOTING AIDS (cont)

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HIGH VOLTAGE

LOSS OF HIGH VOLTAGE

Check by substitution V13, V14, V15 and V16. Check waveform W16.

If Satisfactory	If Unsatisfactory
Check T2, T4A, R100, R11, C79, C78, C80, C81 and other associated components.	Check L21, C74, C75, C77, R92, R96, R95, R93 and other associated components.

INSUFFICIENT HIGH VOLTAGE

Check by substitution V14, V15 and V17. Check R96, R100, C77 and other associated components. Check T2 and T4A.

BLOOMING

Check by substitution V14, V15, V16 and V17. Check R103, R100, R11, C77, C78 and other associated components.

GENERAL

RASTER, SOUND, NO PICTURE

Follow procedure outlined under "Loss Of Video".

RASTER, PICTURE, NO SOUND

Follow procedure outlined under "Weak Or No Sound".

RASTER, NO SOUND, NO PICTURE

Check by substitution V1, V2, V3, V4, V5 and V6. Check audio IF components for failure or change of value.

NO RASTER, NO SOUND

Follow procedure outlined unter "Dead Set".

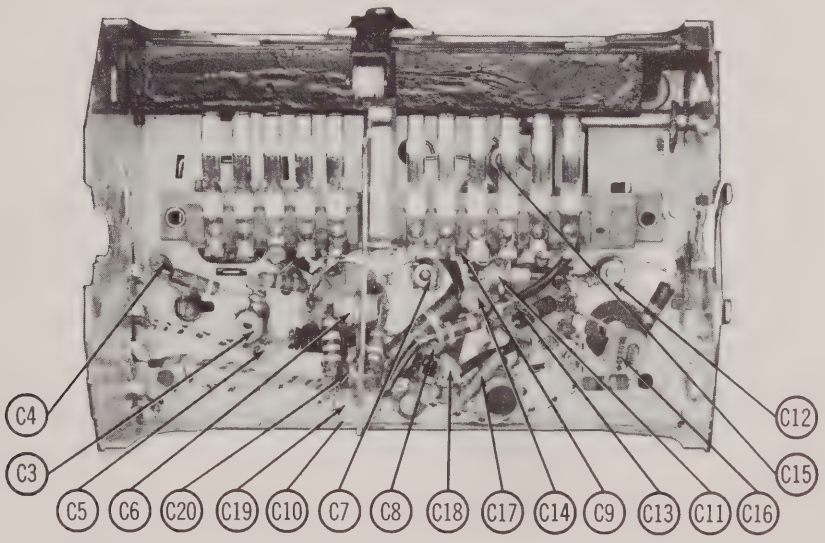
KEYSTONE EFFECT

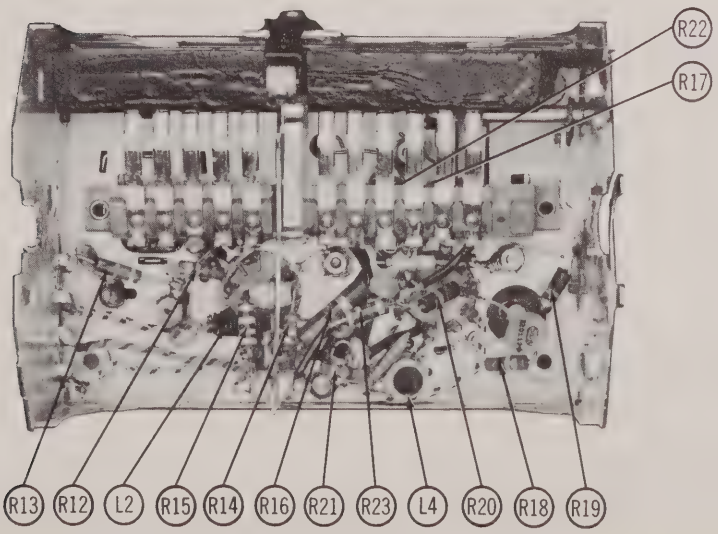
Check T4 and its associated components.

INTERMITTENT STREAKS

Check high voltage section for corona discharge and arcing.

Symptoms shown are assumed and are not indicative of the quality and workmanship of this equipment.





TUNER BOTTOM VIEW

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustments of the VHF tuner oscillator circuit may be accomplished by removal of the channel selector and fine tuning knobs. The adjustments are accessible, one at a time, through the small hole in the cabinet above and slightly to the left of the channel selector shaft.

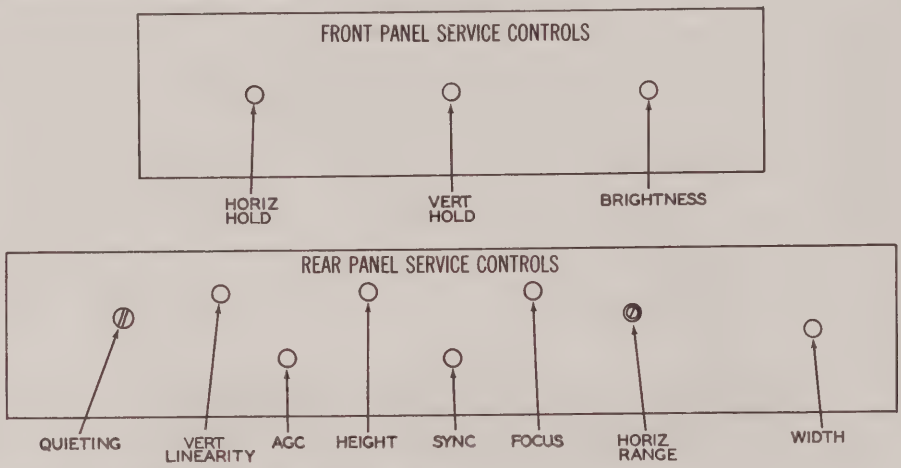
PICTURE TUBE SAFETY GLASS CLEANING

For picture tube safety glass cleaning, it is necessary to remove chassis. (See disassembly instructions.)

PICTURE TUBE REMOVAL

For picture tube removal it is necessary to remove chassis. (See disassembly instructions.)

SERVICE ADJUSTMENT LOCATION



SPECIAL ADJUSTMENTS - AGC CONTROL ADJUSTMENT

Permit the receiver to warm-up for at least five minutes then tune in the strongest TV signal in the area. Rotate the AGC control clockwise until the picture begins to overload or if the signal is weak, to the point where snow is more pronounced in the picture. Rotate the control counter clockwise until the snow is at minimum with the best picture or no sign of overload is visible. It is suggested this control be set on the strongest signal within the area so overloading will not occur when switching from channel to channel.

HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

For adjustment of the horizontal oscillator, it is necessary to remove the rear cover and supply power to set. Adjustment is located on top of chassis. Set the horizontal hold control at its mid-range position and adjust the horizontal oscillator slug (L21) until the picture synchronizes horizontally.

SOUND IF DETECTOR BUZZ ADJUSTMENT

Quieting control (R5) is located on rear apron of chassis. If necessary, adjust slightly for minimum noise in receiver output. If results are unsatisfactory, see sound IF alignment using TV signal on page 6.

CENTERING

Centering is accomplished mechanically by adjusting two magnetic rings around the neck of the picture tube, located flush against the deflection yoke. Rotate the two rings around the neck of the tube until the picture is properly centered.

DISASSEMBLY INSTRUCTIONS

1. Remove 4 push-on type control knobs from front panel.
2. Remove 9 wood screws. Remove rear cover.
3. Disconnect speaker plug.
4. Remove 6 chassis bolts. Remove chassis.
5. Remove 2 speaker nuts. Remove speaker.

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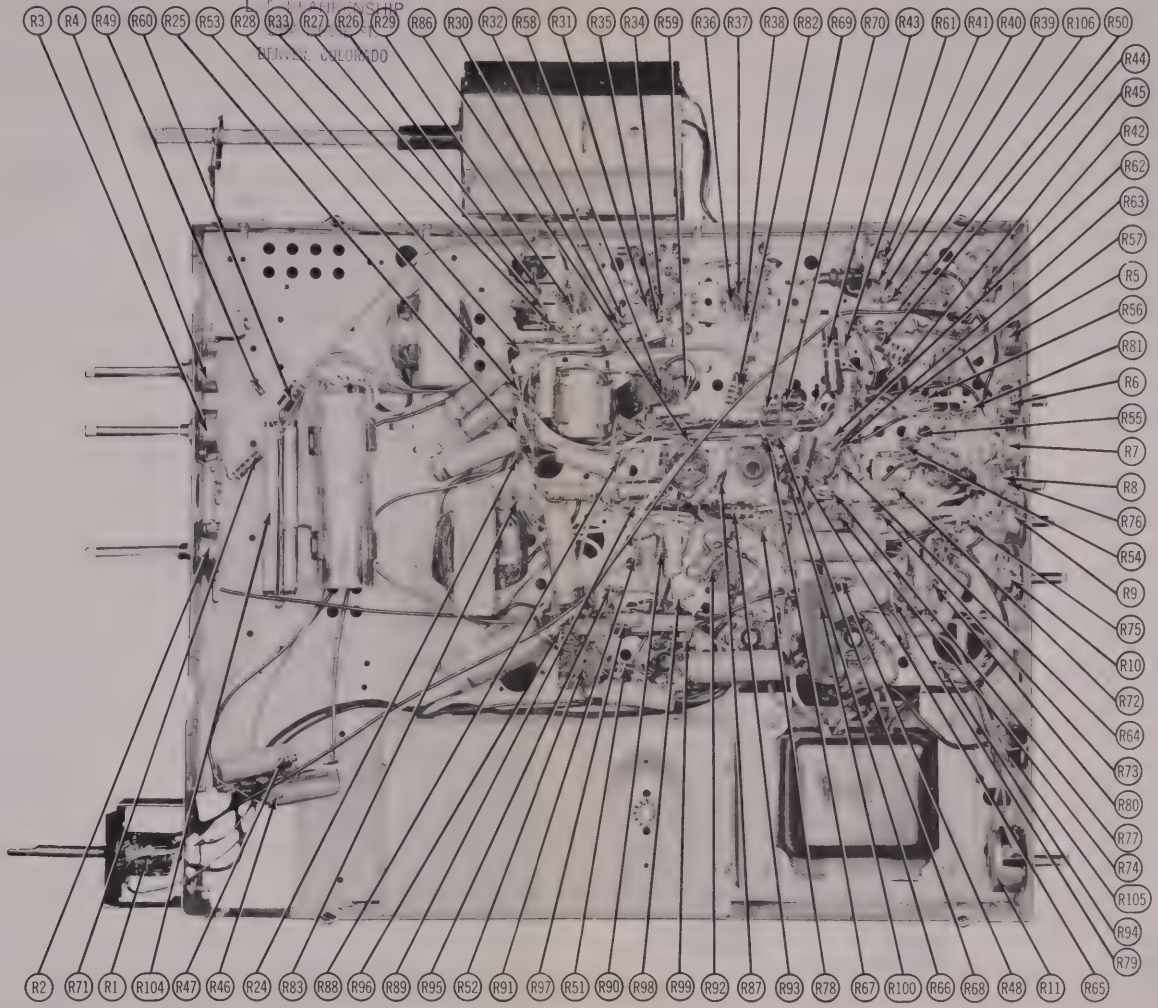
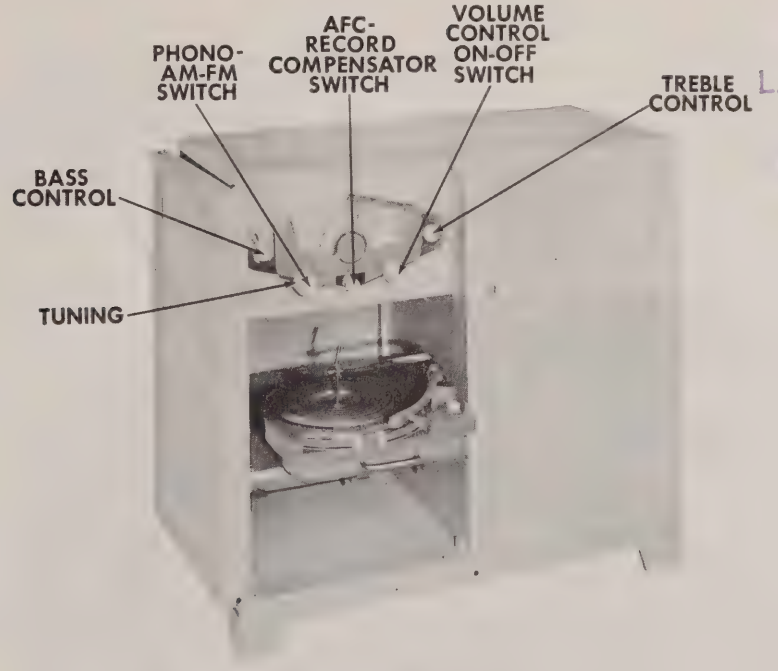


CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

ZENITH MODELS HFR1283E, HFR1284E, HFR1286R, HFR1290R (Ch. 12R20, 12R21)

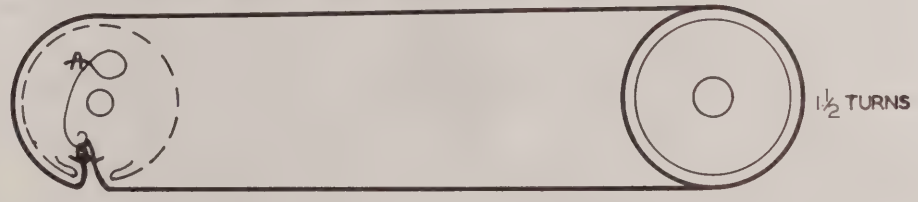
ZENITH MODELS HFR1283E, HFR1284E, HFR1286R, HFR1290R (Ch. 12R20, 12R21)

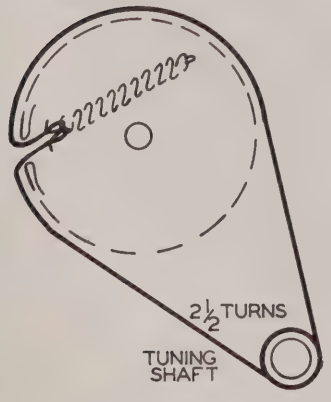


L. F
DENVER, COLORADO

TRADE NAME	Zenith Models HFR1283E (Ch. 12R20), HFR1284E (Ch. 12R21), HFR1286R (Ch. 12R20), HFR1290R (Ch. 12R21)	
MANUFACTURER	Zenith Radio Corp., 6001 Dickens Ave., Chicago, Illinois	
TYPE SET	AC Operated AM-FM-Phono Combination Superheterodyne Receiver With Variable Speed Automatic Record Changer	
TUBES	Twelve	
POWER SUPPLY	110-120 Volts AC-60 Cycles	RATING 1.0 Amp. @ 117 Volts AC
TUNING RANGE-BROADCAST	540KC-1620KC	FREQ. MOD. 88MC-108MC

RECORD CHANGER UNIT - ZENITH MODEL S-14063





TUNING GANG FULLY CLOSED

DIAL CORD STRINGING

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

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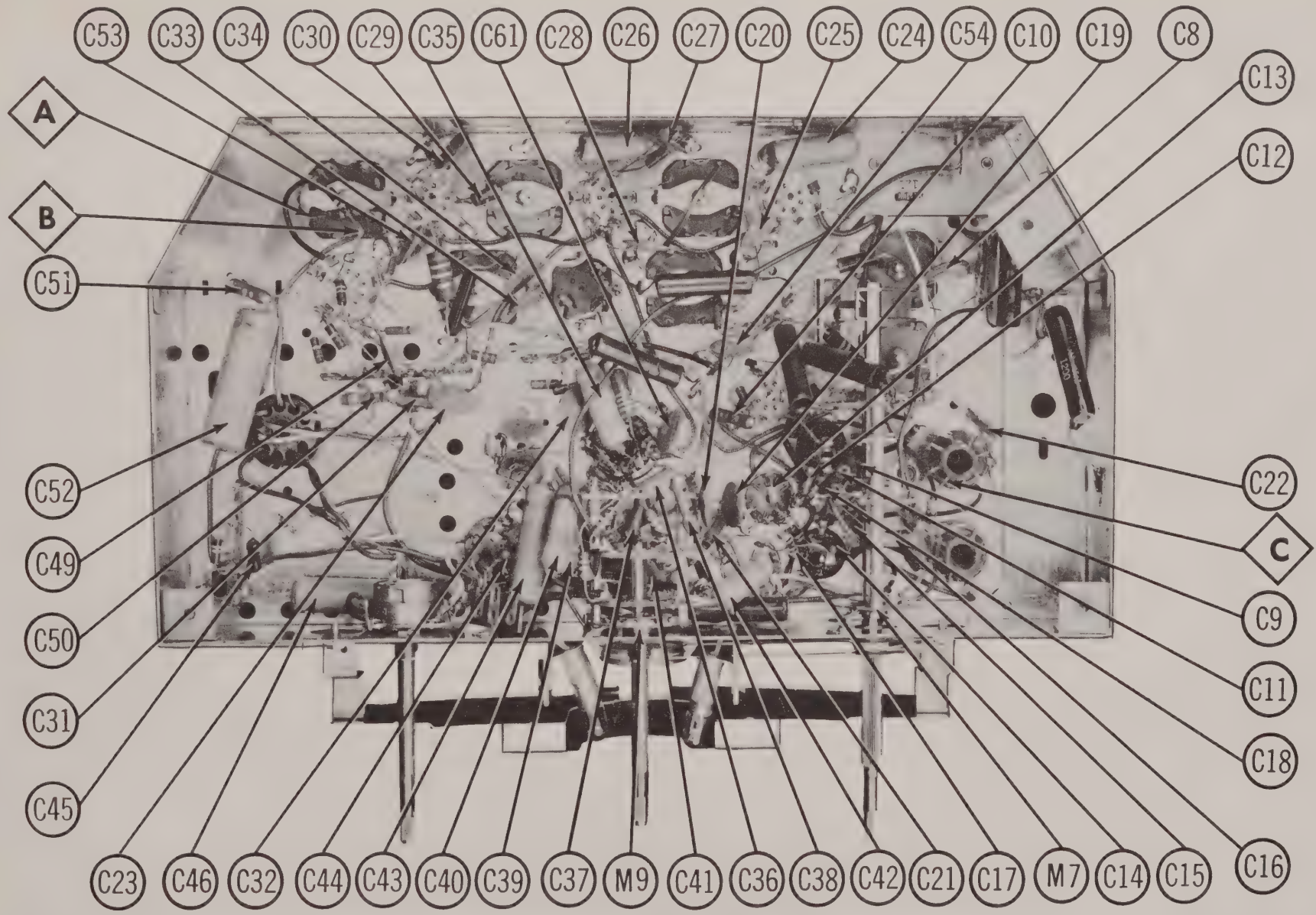
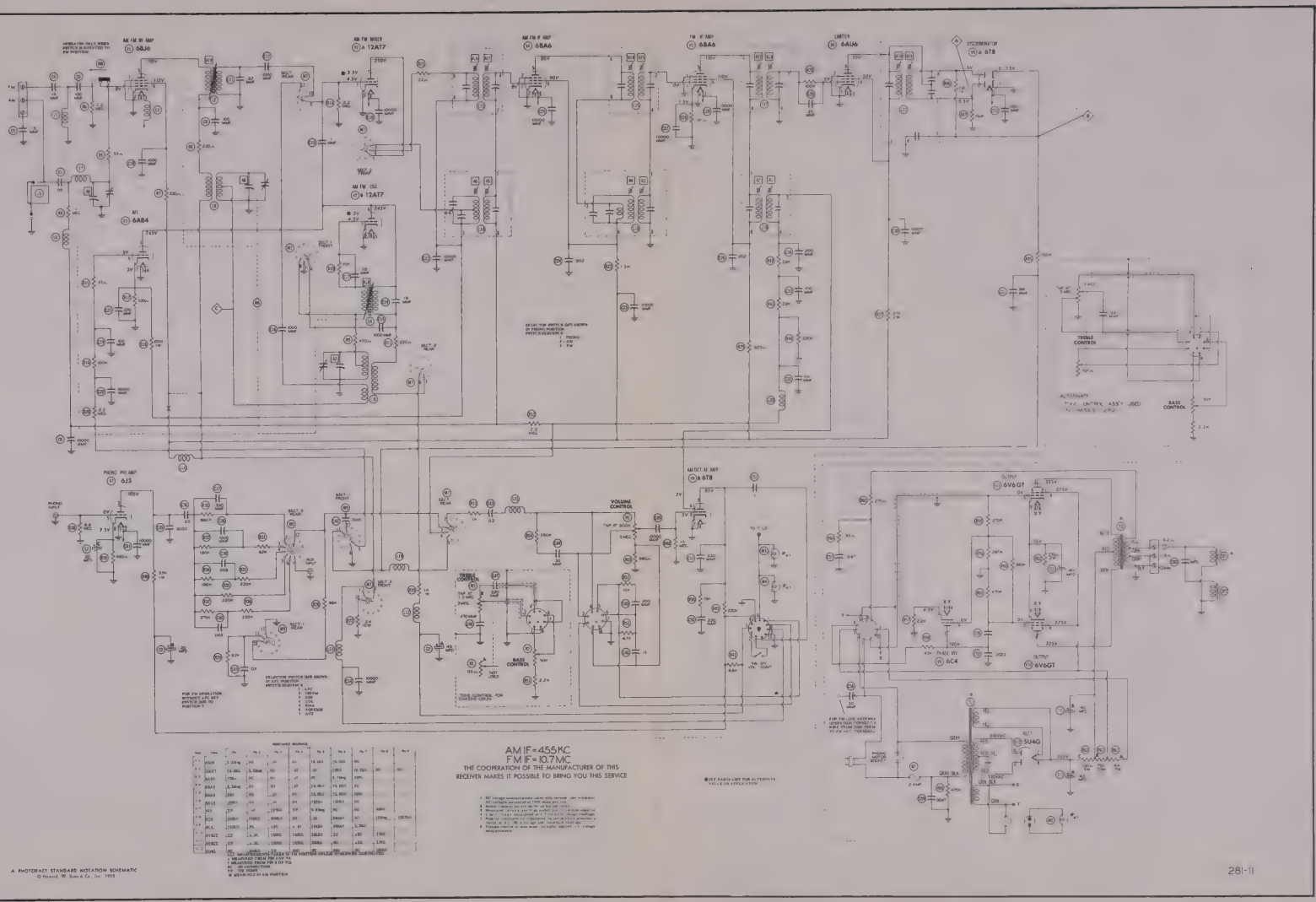
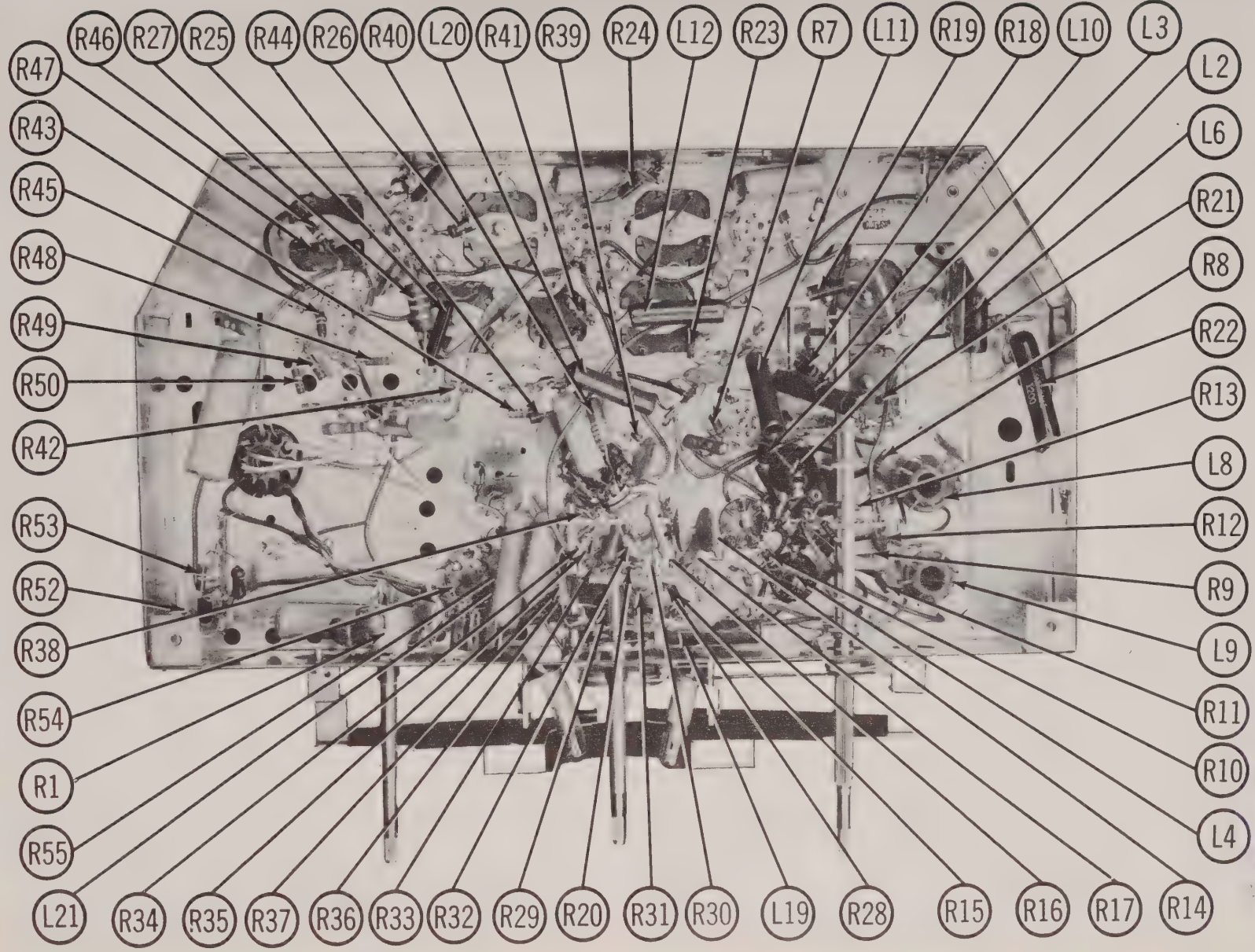


CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION


AM 1ST IF AMP
V1 6BJ6
AM FM MIXER
V2 12AT7
AM FM OSC
V3 12AT7
AM FM IF AMP
V4 6BA6
FM IF AMP
V5 6BA6
LIMITER
V6 6AU6
DISCRIMINATOR
V7 6T8
MPX
V8 6AB4
PHONO PRE AMP
V9 6J5
AM DET AF AMP
V10 6T8
OUTPUT
V11 6V6GT
V12 6C4
OUTPUT
V13 6V6GT
RECT
V14 5U4G
VOLUME CONTROL
TREBLE CONTROL
BASS CONTROL
AM IF=455 KC
FM IF=10.7 MC
THE COOPERATION OF THE MANUFACTURER OF THIS
RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE
A PHOTOFACT STANDARD NOTATION SCHEMATIC
© Howard W. Sams & Co., Inc. 1955
281-11



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

L. F. [illegible] SHOP
[illegible]
3331 MEADE ST.
DENVER, COLORADO

ZENITH
MODEL HER1283E, (Ch. 12R20)

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading.
Use an insulated alignment screwdriver for adjusting.
Loop should be maintained in same relative position to chassis as when receiver is in cabinet.
To set pointer, turn tuning capacitor fully closed and set pointer parallel with base of dial.
Before attempting to align the FM portion of the receiver, the "AFC and Phono Compensator" switch should be turned to "78".

AM ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.05MFD	High side to pin 2 (grid) of 12AT7 (V2). Low side to chassis.	455KC (400∿Mod)	BC	600KC	Across voice coil	A1, A2, A3, A4, A5, A6	Adjust for maximum output.
2.	"	High side to AM antenna terminal. Low side to chassis.	1620KC	"	Tuning gang fully open	"	A7	Adjust for maximum output.
3.	"	"	1400KC	"	1400KC	"	A8, A9	"

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Use only enough signal to provide usable indication on VTVM. Temporarily increase generator output when adjusting A-11.
Use 2Meg isolation resistor in series with DC probe.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
4.	.05MFD	High side to pin 2 (grid) of 6AU6 (V6). Low side to chassis.	10.7MC (Unmod)	FM	Point of non-interference	DC probe to point (A). Common to chassis.	A10	Adjust for maximum deflection.
5.	"	"	"	"	"	DC probe to point (B). Common to chassis.	A11	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.
6.	"	High side to pin 1 (grid) of 6BA6 (V5). Low side to chassis.	"	"	"	DC probe to grid of 6AU6 (V6).	A12, A13	Adjust for maximum deflection.
7.	"	High side to pin 1 (grid) of 6BA6 (V4). Low side to chassis.	"	"	"	"	A14, A15	"
8.	"	High side to point (C). Low side to chassis.	"	"	"	"	A16, A17	Adjust for maximum deflection. Repeat steps 6, 7 and 8.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60∿ modulation and 450KC sweep. Use 120∿ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
4.	.05MFD	High side to pin 1 (grid) of 6AU6 (V6). Low side to chassis.	10.7MC (450KC Swp)	FM	Point of non-interference	Vert. Amp. to point (A). Low side to chassis.	A10	Adjust for curve of maximum amplitude and symmetry similar to Fig. 1.
5.	"	"	"	"	"	"	A11	Adjust so that 10.7MC occurs at center of crossover lines similar to Fig. 2. SLIGHTLY retouch A10 for maximum amplitude and straightness of crossover lines.
6.	"	High side to pin 1 (grid) of 6BA6 (V5). Low side to chassis.	"	"	"	Vert. Amp. to pin 1 (grid) of 6AU6 (V6). Low side to chassis.	A12, A13	Adjust for curve of maximum amplitude and symmetry similar to Fig. 1.
7.	"	High side to pin 1 (grid) of 6BA6 (V4). Low side to chassis.	"	"	"	"	A14, A15	"
8.	"	High side to point (C). Low side to chassis.	"	"	"	"	A16, A17	"

FM RF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
9.	270Ω Carbon Resistor	High side thru 270Ω to FM antenna terminal. Low side to terminal "G"	98MC (Unmod)	FM	98MC	DC probe to pin 1 (grid) of 6AU6 (V6). Common to chassis.	A18, A19	Adjust in order given for maximum deflection.

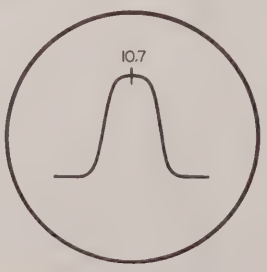


FIG. 1

FIG. 2

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC, WESTINGHOUSE)

ITEM No.	USE	REPLACEMENT DATA		RETMA BASE TYPE	NOTES
		ZENITH PART No.	STANDARD REPLACEMENT		
V1	AM-FM RF Amp.	6BJ6	6BJ6	7CM	
V2	AM-FM Osc.-AM-FM Mixer	12AT7	12AT7	9A	
V3	AFC	6AB4	6AB4	5CE	
V4	AM-FM IF Amp.	6BA6	6BA6	7BK	
V5	FM IF Amp.	6BA6	6BA6	7BK	
V6	Limiter	6AU6	6AU6	7BK	
V7	Phono Preamp.	6J5	6J5	6Q	
V8	Discriminator-AM Det.-AF Amp.	6T8	6T8	9E	
V9	Phase Inverter	6C4	6C4	6BG	
V10	Audio Output	6V6GT	6V6GT	7S	
V11	Audio Output	6V6GT	6V6GT	7S	
V12	Rectifier	5U4G	5U4G	5T	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT	ZENITH PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C1A	▲40	450	22-1612			FP238	TM-D40-450	D-235	Note 1
B	▲40	450							
C2A	▲40	450	22-2438			FP345.3	TM-3052	Q-340	
B	■20	450							
C	▲20	25							
C3	40	25	22-1156			TC29	TD-50-25	FM-0250	Note 2
C4	15		22-2140	D6-150	GP1K-150	UC-5415		K-1415	
C5	15		22-2140	D6-150	GP1K-150	UC-5415		K-1415	
C6	100		22-5	DD-101	GP1K-101	UC-531		K-1310	
C7	.05	200	22-829	DF-503		PT415	IMP2-S5	330215	
C8	10000		22-3	DD-103	811-01	DC-511	IMP4-S1	C-06110	
C9	100		22-5	DD-101	GP1K-101	UC-531		K-1310	
C10	1000		22-1676	D6-102	811-102	UC-521		K-1210	
C11	22		22-1506	D6-220	GP1K-220	UC-5422		K-1422	
C12	1000		22-1676	D6-102	811-102	UC-521		K-1210	
C13	1		22-1762	TCZ-1	NP0A-010				
C14	19		22-2630						
C15	1000		22-1676	D6-102	811-102	UC-521		K-1210	
C16	1000		22-1676	D6-102	811-102	UC-521		K-1210	
C17	50		22-1367	TCZ-50	NP0-338-500	UC-545		K-1450	
C18	10000		22-3	DD-103	811-01	DC-511	IMP4-S1	C-06110	
C19	100		22-9	DD-101	GP1K-101	UC-531		K-1310	
C20	10000		22-3	DD-103	811-01	DC-511	IMP4-S1	C-06110	
C21	220		22-2321	D6-221	GP2K-221			K-1322	
C22	10000		22-3	DD-103	811-01	DC-511	IMP4-S1	330611	
C23	10000		22-3	DD-103	811-01	DC-511	IMP4-S1	330611	
C24	.002	600	22-1220	D6-202	GP2-333-202	PT622	IMP6-D2	330622	
C25	10000		22-3	DD-103	811-01	DC-511	IMP2-S1	C-06110	
C26	.002	600	22-1220	D6-202	GP2-333-202	PT622	IMP6-D2	330622	
C27	10000		22-3	DD-103	811-01	DC-511	IMP2-S1	C-06110	
C28	10000		22-3	DD-103	811-01	DC-511	IMP2-S1	C-06110	
C29	25		22-1887	D6-250	GP1K-250	UC-5425			
C30	10000		22-3	DD-103	811-01	DC-511	IMP6-S1	330611	
C31	680		22-2387	D6-681	GP2K-681	UC-5368		K-1368	
C32	100		22-5	DD-101	GP1K-101	UC-531		K-1310	
C33	100		22-5	DD-101	GP1K-101	UC-531		K-1310	
C34	200		22-2472	TCN-200	N750-337-201			K-1320	
C35	.0005	600	22-1117	D6-501	GP2K-501	UC-535	IMP6-T5		
C36	.05	600	22-171	DF-503		PT615	IMP6-S5	330615	
C37	330		22-1671	D6-331	GP2K-331	UC-5333		K-1333	
C38	1000		22-2218	D6-102	811-102	UC-521		K-1210	
C39	.008	200	22-1530			PT1628			
C40	.003	600	22-288	D6-302	GP2-333-302	PT623	IMP6-D3	330623	
C41	.03	600	22-1520			PT613	IMP6-S3	330613	
C42	.0015	400	22-2629	D6-152	GP2L-152		IMP6-D15	3306215	
C43	.02	600	22-830	DF-203	817-02	PT612	IMP6-S2	330612	
C44	30		22-1768	D6-300	GP1K-300			K-1430	
C45	200		22-1866	D6-201	GP2K-201	UC-532		K-1320	
C46	.15	200	22-1025				IMP2-P15	3302015	

PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS (cont)

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	ZENITH PART No.	IRC PART No.	
R28	68KΩ	½	63-1862	BTS-68K	
R29	82KΩ	½	63-1866	BTS-82K	
R30	680KΩ	½	63-1904	BTS-680K	
R31	82KΩ	½	63-1866	BTS-82K	
R32	180KΩ	½	63-1880	BTS-180K	
R33	220KΩ	½	63-1883	BTS-220K	
R34	180KΩ	½	63-1880	BTS-180K	
R35	220KΩ	½	63-1883	BTS-220K	
R36	220KΩ	½	63-1883	BTS-220K	
R37	270KΩ	½	63-1887	BTS-270K	
R38	6.8Meg	½	63-1946	BTS-6.8Meg	
R39	680Ω	½	63-1778	BTS-680	
R40	33KΩ	1	63-957	BTA-33K	
R41	6800Ω	½	63-1820	BTS-6800	
R42	22KΩ	½	63-1842	BTS-22K	
R43	22KΩ	½	63-1842	BTS-22K	
R44	220KΩ	½	63-1884	BTS-220K	
R45	100KΩ	½	63-1869	BTS-100K	
R46	150KΩ	½	63-1876	BTS-150K	
R47	150KΩ	½	63-1876	BTS-150K	
R48	15Meg	½	63-1961	BTS-15Meg	
R49	220KΩ	½	63-1884	BTS-220K	
R50	15KΩ	½	63-1835	BTS-15K	
R51	2200Ω	½	63-1799	BTS-2200	
R52	4700Ω	½	63-1813	BTS-4700	
R53	10KΩ	½	63-1827	BTS-10K	
R54	390KΩ	½	63-1894	BTS-390K	
R55	680Ω	½	63-1778	BTS-680	
R56	390KΩ	½	63-1894	BTS-390K	
R57	2200Ω	½	63-1799	BTS-2200	
R58	47KΩ	½	63-1856	BTS-47K	
R59	270KΩ	½	63-1887	BTS-270K	
R60	390KΩ	½	63-1894	BTS-390K	
R61	470KΩ	½	63-1898	BTS-470K	
R62	270Ω	2	63-1452	BTB-270	Note 1
R63A	4000Ω	15			
B	750Ω	7.5	63-3255		Note 2
C	130Ω	5			Note 3
R64	150Ω	½	63-1750	BTS-150	Note 4
R65	270Ω	½	63-1761	BTS-270	Note 4
R66	470KΩ	½	63-1898	BTS-470K	

Note 1: Chassis 12R21 uses a 180Ω 4 watt resistor in this application.
Note 2: Chassis 12R21 uses a 1300Ω 15 watt resistor in application R36B.
Note 3: Chassis 12R21 replaces R63C with a 100Ω 5 watt resistor, part no. 63-3218.
Note 4: Not used in chassis 12R21.

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA					
	PRI.	SEC. 1	SEC. 2	SEC. 3	ZENITH PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117VAC @ 1A	636VCT .143ADC	5VAC @ 3A	6.3VAC @ 3.56A	95-1414 95-1394 ①					

① Used in chassis 12R21.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	ZENITH PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	7.6KΩ CT	3.8Ω Tap @ 1.6Ω	95-1415 95-1395 ①						① Audio output used in chassis 12R21.

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	ZENITH PART No.	QUAM PART No.	
SP1	3 1/2"	PM	11.8Ω	49-777	3A15T	① 12" PM speaker used in chassis 12R21. (8Ω voice coil)
SP2	12"	PM	3.8Ω	49-778 49-760 ①	12A6A	

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	ZENITH PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	FM RF Choke	0Ω		S-16408	19-3001		4602	1 Microhenry
L2	FM RF Coil	0Ω	0Ω	S-15743				
L3	Fil. Choke	.7Ω		S-13997	19-1005		4612	9.5 Microhenries
L4	FM Osc. Coil	0Ω	0Ω	S-15691				
L5	Loop Ant.	.3Ω						
L6	RF Choke	0Ω		20-337	19-1003		4608	3.8 Microhenries
L7	AM Ant. Loading Coil	3.5Ω						
L8	AM RF Coil	2.2Ω	11Ω*	S-16344				*Tapped at 3.5Ω
L9	AM Osc. Coil	1Ω	8.5Ω■	S-22185				■Tapped at 3.5Ω; Tertiary winding = 4.7Ω
L10	RF Choke	0Ω		20-337	19-1003		4608	3.8 Microhenries
L11	RF Choke	0Ω		20-337	19-1003		4608	
L12	RF Choke	0Ω		20-337	19-1003		4608	
L13	1st FM IF	.4Ω	.4Ω	95-1201	16-6665▲	FM-251	1451	
L14	1st AM IF	¶	16Ω	95-1248				¶ Tapped at 4.6Ω

PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS (cont)

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA ZENITH PART No.	CENTRALAB PART No.	ERIE PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	
C47	220		22-2321	D6-221	GP2K-221	UC-5322		K-1322	
C48	470		22-2302	D6-471	GP2K-471	UC-5347		K-1347	
C49	10000		22-3	DD-103	811-01	DC-511	IMP6-S1	330611	
C50	220		22-2321	D6-221	GP2K-221	UC-5322		K-1322	
C51	330		22-2309	D6-331	GP2K-331	UC-5333		K-1333	
C52	.1	600	22-417	DF-104		PT601	IMP6-P1	330601	
C53	10000		22-3	DD-103	811-01	DC-511	IMP4-S1	C-06110	
C54	10000		22-3	DD-103	811-01	DC-511	IMP4-S1	330611	
C55	.0022	600	22-1814	D6-222	GP2-333-222	PT6222	IMP6-D22	3306222	Note 3
C56	.1	600	22-1841	DF-104		PT601	IMP6-P1	330601	
C57	.047	200	22-1778	DF-503		PT4147	IMP4-S47	3304147	Note 3
C58	30		22-1705	D6-300	GP1K-300			K-1430	
C59	.0047	600	22-2579	D6-472	GP2-333-472	PT6247	IMP6-D47	3306247	
C60	1	120				PT41	CT2-1	330210	
C61	10000		22-3	DD-103	811-01	DC-511	IMP4-S1	C-06110	

Note 1. Chassis 12R21 uses a 40-40MFD @ 475V capacitor (Zenith part #22-2581) in this application.
Note 2. Chassis 12R21 uses a 100MFD capacitor (Zenith part #22-2580) in this application.
Note 3. Not used in Chassis 12R21.

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA ZENITH PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES	
R1A	1.5Meg	½	63-2891	Q18-139X	A47F3-2Meg	ABT-83	UT-451	Volume tapped at 800KΩ	
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R1A	
C	Switch		Not Req.	76-1	SWE-12	KB-1	US-26	Attach to R1A	
R2A	50KΩ	½	63-3216	Q13-123	A47-50K-Z	AB-32	U-33	Bass	
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R2A	
R3A	100Ω	2	63-3215					Wire-wound - Note	Treble
B	3Meg	½						Tapped at 1.5Meg	Treble

Note: The panel element of this control is used in chassis 12R21 only.

RESISTORS

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA ZENITH PART No.	IRC PART No.	NOTES
R1	1Meg	½	63-1912	BTS-1Meg	
R5	33Ω	½	63-1723	BTS-33	
R6	2.2Meg	½	63-1926	BTS-2.2Meg	
R7	220Ω	½	63-1758	BTS-220	
R8	220Ω	½	63-1758	BTS-220	
R9	470Ω	½	63-1772	BTS-470	
R10	10KΩ	½	63-1827	BTS-10K	
R11	220Ω	½	63-1758	BTS-220	
R12	2.2Meg	½	63-1926	BTS-2.2Meg	
R13	1000Ω	½	63-1786	BTS-1000	
R14	2.2Meg	½	63-1926	BTS-2.2Meg	
R15	47Ω	½	63-1730	BTS-47	
R16	100KΩ	½	63-1869	BTS-100K	
R17	330Ω	½	63-1764	BTS-330	
R18	100KΩ	1	63-2137	BTA-100K	
R19	1000Ω	1	63-1574	BTA-1000	
R20	2.2Meg	½	63-1926	BTS-2.2Meg	
R21	22Ω	½	63-1716	BTS-22	
R22	1200Ω	10	63-2021	1 3/4A-1200	
R23	1500Ω	½	63-1793	BTS-1500	
R24	100Ω	½	63-1744	BTS-100	
R25	820Ω	½	63-2091		
R26	100KΩ	½	63-1870	BTS-100K	
R27	27KΩ	2	63-947	BTB-27K	

PARTS LIST AND DESCRIPTIONS (Continued)

COILS (cont)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA ZENITH PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L15	2nd FM IF	.4Ω	.4Ω	95-1150	16-3487♦	FM-251▲	1451▲	
L16	2nd AM IF	.4Ω	16Ω	95-1249				
L17	3rd FM IF	.4Ω	.4Ω	95-1150	16-3487♦	FM-251▲	1451▲	
L18	3rd AM IF	16Ω	11Ω	95-1254	16-5742▲	BC-340▲	912-C4▲	
L19	FM Audio Coupling Coil	0Ω		20-337	19-1003		4608	
L20	AM Audio Coupling Coil	0Ω		20-337	19-1003		4608	
L21	AM Audio Coupling Coil	0Ω		20-337	19-1003		4608	
L22	Discriminator	.4Ω	.4ΩCT	95-1153	17-3484†	FM-250#	1452#	

▲ Drill new mounting hole.
♦ Remove center spade bolt mounting support & use adaptor plate.
▲ Remove center spade bolt mounting support.
† Add diode filter cap externally, drill new mounting holes & remove center spade bolt mounting support.
# Add diode filter cap externally & remove center spade bolt mounting support.

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA ZENITH PART No. FUSE	ZENITH PART No. HOLDER	LITTELFUSE PART No. FUSE	LITTELFUSE PART No. HOLDER	BUSS PART No. FUSE	BUSS PART No. HOLDER
M1	3AG	2A 250V	136-24		318002		GJV2	

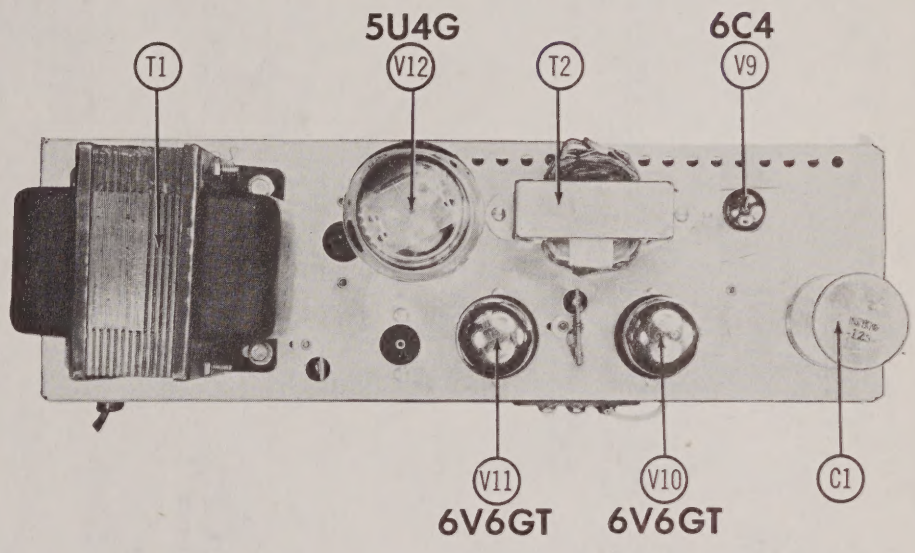
PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA ZENITH PART No.	ASTATIC PART No. CARTRIDGE	ASTATIC PART No. NEEDLE	ELECTRO-VOICE PART No. CARTRIDGE	ELECTRO-VOICE PART No. NEEDLE	REMARKS
M2	142-77					

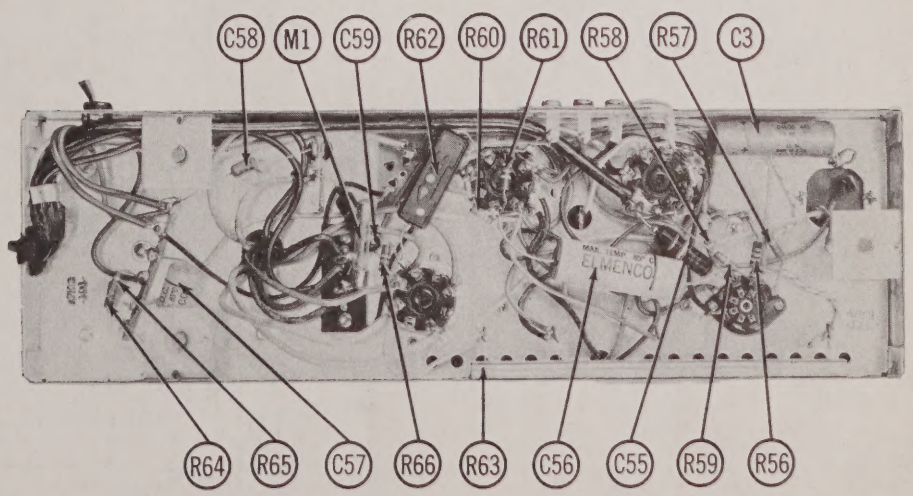
MISCELLANEOUS

ITEM No.	PART NAME	ZENITH PART No.	NOTES
M3	Dial Light	100-67	#47
M4	Dial Light	100-67	#47
M5	Pilot Light	100-67	#47, Cabinet jewel
M6	Tuning Cap.	22-2400	3 Gang (18-370MMF, 11-200MMF, 11-85MMF)
M7	Switch	85-557	Band (Rotary - wafer type)
M8	Switch	85-505	AM-FM (Slide Type - SPDT) Ganged mechanically to M7
M9	Switch	85-558	Phono Compensation (Rotary-wafer type)
	Cabinet	14-1770E	Model HFR1283E
	Cabinet	14-1771R	Model HFR1286R
	Cabinet	14-1709R	Model HFR1290R
	Cabinet	14-1721E	Model HFR1284E

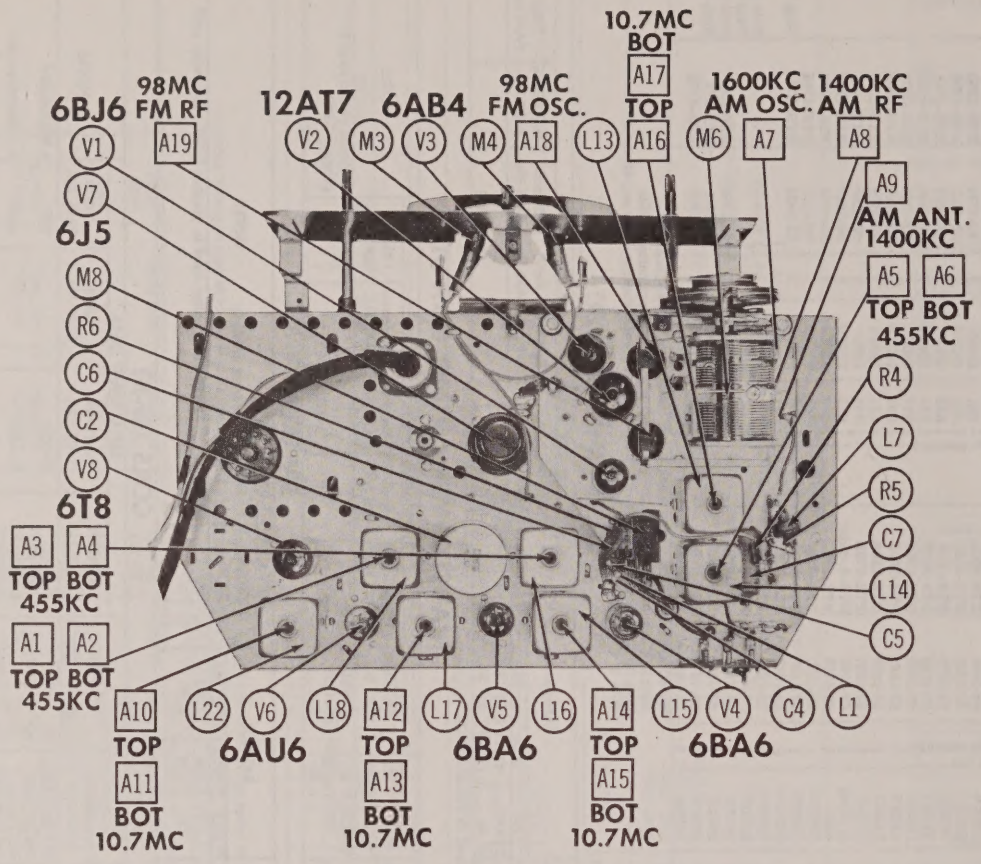
PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO



POWER CHASSIS - TOP VIEW



POWER CHASSIS - BOTTOM VIEW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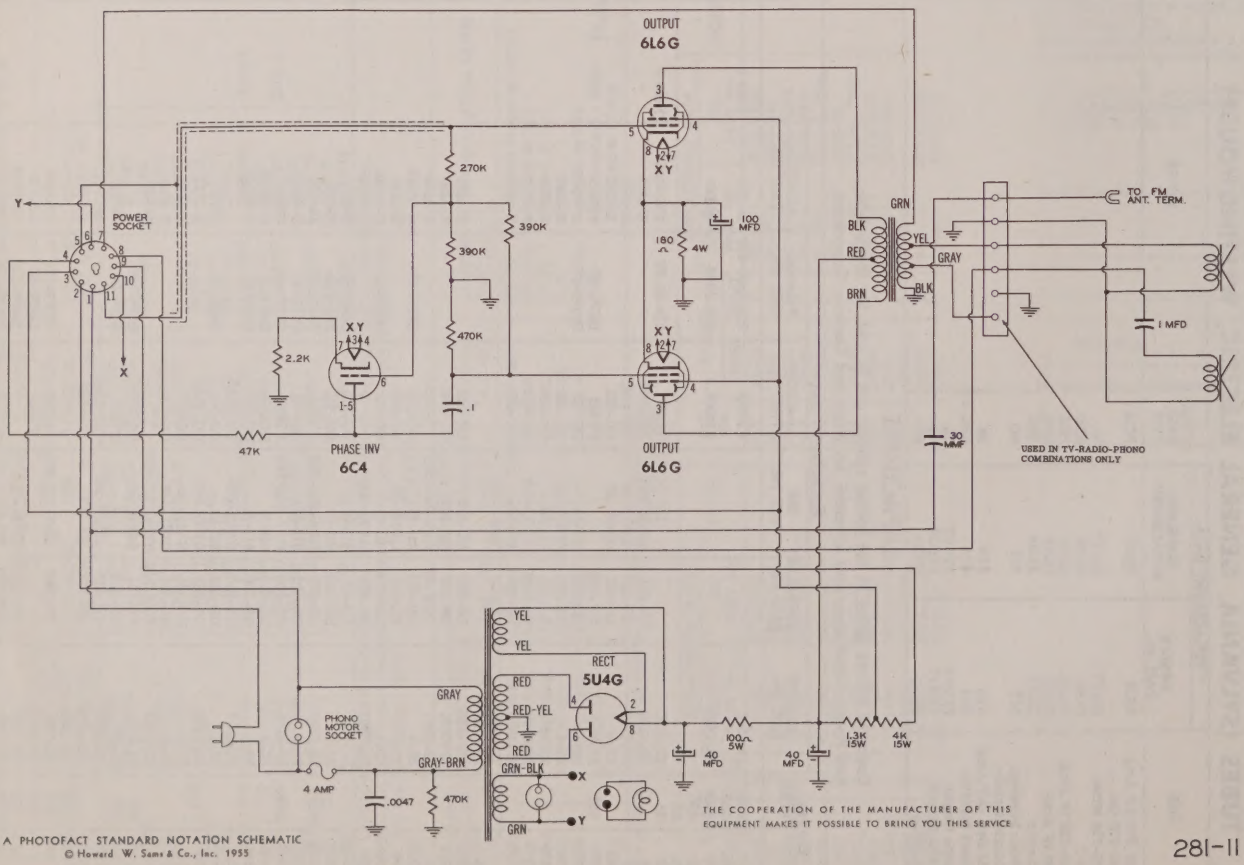
1400KC AM RF A7 A8
AM ANT. 1400KC A9
TOP BOT 455KC A5 A6
6J5 M8 R6 C6 C2
6T8 V8
TOP BOT 455KC A3 A4
TOP BOT 455KC A1 A2
R4 L7 R5 C7 L14 C5
A10 TOP A11 BOT 10.7MC
L22 V6 6AU6
L18 A12 TOP A13 BOT 10.7MC
L17 V5 6BA6
L16 A14 TOP A15 BOT 10.7MC
L15 V4 6BA6
C4 L1

CHASSIS TOP VIEW



POWER CHASSIS USED WITH RADIO 12R21